University of Dundee

Change is never easy

Gordon, Lisi; Cleland, Jennifer A.

Link to publication in Discovery Research Portal

DR. LJ GORDON (Orcid ID : 0000-0002-4986-1501)

PROF. JENNIFER CLELAND (Orcid ID : 0000-0003-1433-9323)

Change is never easy: how management theories can help operationalise change in medical education

Lisi Gordon,[1] Jennifer A Cleland[2]

[1]Centre for Medical Education, University of Dundee, Dundee, UK

[2] Lee Kong Chian School of Medicine, Nanyang Technological University, Singapore

Address for correspondence:

Dr Lisi Gordon, Centre for Medical Education, School of Medicine, MacKenzie Building, Ninewells Hospital, University of Dundee, UK DD2 4BF.

Tel: +44 (0) 1382 384394

Email: l.y.gordon@dundee.ac.uk

Abstract

Context

Medical education is not simple, nor stable and is highly contextualised, so ways of perceiving multiple connections and complexity are fundamental when seeking to describe, understand and address concerns and questions related to change.

Proposal

Addressing calls in the literature, we introduce three examples of contemporary organizational theory which can be used to understand and operationalise change within medical education. These theories - institutional logics, paradox theory, and complexity leadership theory – are relatively unknown in medical education. However, they provide a way of making sense of the complexity of change creatively. Specifically, they cross-cut different levels of analysis and allow us to 'zoom in' to the micro levels as well as 'zoom out' and connect what is happening at the individual level (the micro-level) to what happens at a wider institutional and even national/international level (the macro-level), thus providing a means of understanding the interactions between individuals, teams, organizations and systems. We highlight the potential value of these theories, provide a brief discussion of the few studies that have used them in medical education, and then briefly critique each theory.

Conclusions

We hope that by drawing attention of readers to the potential of these management theories we can unlock some of the complexity of change in medical education, support new ways of thinking and open new avenues for research.

Introduction

Standard ways of thinking about organisational change and development suggest that change happens when policy makers, leaders and managers change the vision, structure or procedures in an organisation and then persuade others to implement their new strategy. [1,2] However, such top-down (driven by the top [management]) change efforts often fail to meet their intended purposes and instead result in disturbance, resistance to change from individuals and groups, and unintended consequences. [3] This is no different in medical education. Major changes have occurred in medical education over the last few decades, including the shift from apprenticeship models of teaching and learning towards competency and outcomes based medical education, [4-6] and the use of simulation training for the mastery of technical skills. [7-9] Despite these notable examples, other attempts at change are less successful. There are plenty of examples in medical education illustrating where changing different curricula ingredients – selection processes, the medical school space, and introducing new learning tools – did not work as planned. [10-12] Nor are the actual processes of change straightforward: attempts to reform curricula in medical education have been previously described as challenging [13], disruptive[14] and often manifest themselves as an exercise that results in repetition of sameness but no actual reform in the process. [15, 16]

Why is this the case? We believe that this is because medical education and training are highly complex, characterised by multiple relationships and connections between people, contexts and systems. [17] These interconnections generate their own impacts on the wider system(s) and the system(s) in turn impacts on individuals and groups.[3] For example, the context, or prevailing environment,[18-20] is the underlying frame within which change is implemented, change occurs, and outcomes emerge.[21] Without a deep and broad understanding of these factors we risk falling prey to solution-ism, the theme of this special issue, by treating complex problems as having simple answers. However, what works in one place may not work in another. Individuals and teams may straddle multiple, overlapping and interconnected contexts and therefore will be influenced by, and will have influence on, these contexts.[3,22] Moreover, the outcomes, or goals of medical education are not static: they shift on the basis of global and national societal drivers of healthcare and

healthcare/medical education[23]- a very pertinent example being the recent significant changes in the delivery of medical education in response to the global COVID-19 pandemic. [24]

The notion of complexity in medical education is not new [25-27]– mirroring thinking about health systems.[28-32] Many different theories of complexity exist, and these are used in multiple, not always unproblematic, ways in medical education research.[33] Moreover, although the discourse of complexity is present in medical education, it does not seem privileged in the "everyday": undesirable and/or unanticipated consequences of change are often due to failing to acknowledge complexity and the impact of this complexity. [34-36] However, if medical education is not simple, nor stable and is highly contextualised, ways of perceiving multiple connections and complexity are fundamental when seeking to describe, understand and address concerns and questions related to change.[14] Only by foregrounding this complexity can we create approaches to change that are both fit for purpose and future focused.

Taking the position that complexity 'is little more than a general world view at a high level of abstraction - it needs to be refined, adapted and applied in different ways for different research questions' [37] - in this article we present several contemporary organizational theories which can be used to move beyond the metaphor to understand and operationalise change within medical education. These theories provide a way of making sense of the complexity of change creatively, without assuming change is straightforward or controllable. By doing so, they prepare those involved with change in medical education to embrace obstacles, challenges and the unexpected, to see these as inherent to the process of change. [38]

Furthermore, we believe there is particular value in embracing theories that cross-cut different levels of analysis and allow us to 'zoom in' to the micro levels as well as 'zoom out' and connect what is happening at the individual level (the micro-level) to what happens at a wider institutional and even national/international level (the macro-level).[39] Only by doing so can we understand how macro level understandings of change will connect to and influence interactions at the level of the individual and team, and conversely how individuals

and teams will have agency to influence and affect at the level of organizations and systems. [3, 39] These multi-level understandings can help explain why organizational changes succeed, fail or have unintended consequences and will help those involved in change anticipate and manage uncertainty associated with a change process.

We acknowledge that we are not the first to apply a complexity lens to medical education. [31-33] However, addressing earlier calls in the literature to consider more use of organizational theory in medical education research, [40] we add to knowledge in the field by explicitly connecting theoretical perspectives from organisation studies to the complexity of change in medical education, with the ultimate aim of encouraging different ways of thinking, to open new avenues for thought and exploration. The theories we present forthwith are: institutional logics[41]; paradox theory[42]; and complexity leadership theory (CLT).[43] These three theories have been chosen because they all foreground the connection of everyday interaction to wider organisational and systems, particularly during times of change. The theories, what they emphasise, their potential explanatory power[44, 45] and some examples of possible research questions are summarized in Table 1. Note that some of the example research questions chosen could be addressed through more than one theory in the table, an approach that, if pursued, could lead to even greater understanding of change.

It is important to acknowledge our positionality at this point. A physiotherapist by background, LG has worked in the fields of medical education and management studies since 2008. She has drawn on educational and management theories, grounded in complexity, to study healthcare leadership, professional identities and doctors' transitions. [46, 47] An occupational and clinical psychologist by background, JC worked in the field of organisational change before moving into medical education in 2000. She has drawn on complexity and change theories when enacting various leadership roles, and has also brought management theory into her research to help understand organisational issues, including those where there is an obvious interface between macro- and micro factors. [40, 48]

[Insert Table 1 around here]

Institutional logics

Institutional logics (IL) were introduced by Friedland and Alford[41] who argued that attention to societal-level institutional orders such as national culture, politics and societal-level norms was crucial to understand organizational, groups and individual behaviour. Logics are societal 'ways of ordering reality'[41:p243], or expectations, norms, beliefs and rules which shape goals, behaviours and practices at an organizational, professional and individual level.[39, 49] More recently, IL has been defined as '*socially constructed historical patterns of cultural symbols and material practices, including assumptions values and beliefs by which individuals and organizations provide meaning to their daily activity, organize time and space, and reproduces their lives and experiences*'.[49:p2]

These logics, or influences, are often taken-for-granted, controlling activity through established norms.[49] For example, in Western healthcare, medical professional logics, traditionally embedded in expert knowledge and autonomous practice has historically governed how healthcare systems were viewed and processes of decision-making were enacted.[39] However increasing demand for healthcare provision and reducing ability (or inclination) of governments to fund healthcare in its entirety has led to the rise of managerialism and the influence of market and corporate logics.[50,51] Table 2 provides an example summary of what some of the organizational literature perceives to be the institutional logics at play in healthcare.[52,53]

[Insert Table 2 around here]

Multiple logics exist in the same space (e.g., managerialism versus professionalism) and vie for dominance.[49, 54-56] The precise nature of the relationship between different logics is much discussed and debated but generally speaking, different logics can co-exist in the same space (logic segmenting), but the influence of these different logics on actors will vary, and they

will be enacted and expanded on differentially by different actors.[54] For example, medical education is typically influenced by the logics inherent in both healthcare and education, which may or may not complement each other. Differences between logics and their respective influence can lead to change in logic meanings and shifts from one dominant logic to another.[57-59]

To illustrate how IL can be used as an explanatory lens, we turn to a specific example. Trish Reay and her colleagues have written extensively in the organizational literature about drawing on IL to understand change in healthcare organizations.[52, 60, 61] An example of their work includes using IL to explore change in a group of family physicians' collective professional role identity over time.[52] At the beginning of the study, physicians were labelled as 'autonomous expert'; with the ideal type logics professional very strong, whilst state, corporate and market logics was low.

By the end of the study physicians described their role identity as head of a team, deferring responsibility of many tasks that had previously been the sole remit of physicians (for a detailed explanation of this study please see Box 1 in supplementary materials for this paper). This study demonstrates how using an IL perspective can allow researchers to illustrate how micro-level workplace interactions effect widespread professional change.

Applying Institutional Logics to Medical Education Research

Focus when researching medical education using IL should be on how individuals, teams and organizations draw meaning from and enact different logics in practice, and the interplay (and potential push-pull) between different logics.[56] One position paper published in 2010 considered the over-arching plural logics of science and care in medical education, and how different contextual factors (e.g., the rise of managed care, more women entering medicine) were associated with one or other logic, how these fluctuated over time, and created dynamic tensions about how to educate future doctors.[62] We identified only two papers using IL as a framework in empirical work, both from the same team who were looking specifically at how Health Professions Education Scholarship Units (HPESU) shared values and practices despite regional, national and international contextual differences.[63, 64] Using

analysis of interviews and documentary analysis the authors mapped out three dominant logics across HPESUs from Canada, the US, Australia and New Zealand. [63]. . These were the logics of: (1) financial accountability; (2) a cohesive educational continuum; and (3) academic research, service and teaching. Whilst these were common logics across all HPESUs, the authors identified that different logics held different dominance in each context, reflecting wider national systems. The relative power of each logic influenced the nature of the activities (e.g., the balance of time spent on service or scholarship) and outputs valued by each unit. They concluded that understandings of these logics gave insight into why individual units are structured and function in particular ways.

Looking at the wider literature, research using an IL perspective has illustrated an inherent struggle between healthcare managerial logics and medical logics.[39,58,] In medical education, similar tensions exist between, for example, service and education provision.[65] An IL perspective may help highlight the multiple and competing logics inherent in service and education and may help foreground the underlying causes of these tensions at multiple levels.

An example of segmenting in medical education relates to the multiple logics associated with professional standards. Educational standards from professional associations, such as the UK's General Medical Council (GMC), or the Australian Health Practitioner Regulation Agency (AHPRA), can and do compete with the logics of workplace standards that have been set by individual healthcare organizations. Similarly, educational standards from regulators whose remit covers medical schools can be in tension with local university regulations relating to assessment and progression.   IL could be used as a framework to explore how these logics co-exist, potentially providing new perspectives on (for example) meanings of professionalism and professional behaviours. Longitudinal work in this field could reveal the agency of individuals and groups to influence both organizational and professional logics.

Paradox Theory

Paradox theory refers to a group of theories which focus on the conflicting but interrelated goals and competing demands within an organization that co-exist and persist over time.[66,67] Considered ubiquitous, these simultaneous, inconsistent states might be between "innovation and efficiency, collaboration and competition, or new and old".[68, p703] For example, organizational change involving the creation of project teams for planning and enacting change (e.g., curriculum reform) can create role ambiguity (e.g. is the reform or business-as-usual the priority?). A different example, that of an employee-versus-organization tension, would be the use of practices such as bonuses (standard in universities in some countries) which can lead to rivalry and conflict among colleagues and have adverse effects on well-being.[69] These examples illustrate how paradoxes are both inherent in systems and socially constructed due to different stakeholders' diverse goals and positions.[70]

The paradox perspective views tensions within organizations as latent until times of change or disruption at which point they become visible.[70] If paradoxes are not attended to, "ambivalence, conflict, chaos and collapse ensue".[71:p12] But finding a balanced approach is key – paradoxical tensions are unresolvable by "either/or" approaches as stressing one tension exacerbates the need for the other, perhaps providing short-term relief but ultimately raising defences and impeding learning of new ways to work.[72] To illustrate both this and how paradox theory can be used as an explanatory lens, we turn to a specific example. Cleland et al[40] used paradox theory to explore how those working in a general surgery department in a university teaching hospital experienced, perceived and responded to service–training tensions. They found many tensions apparent in the data, with managers, surgeons and trainees/residents in conflict because of differing perspectives on the same issue of balancing service and training. This adversely impacted on relationships across and within these groups and led to individuals prioritising their own goals. Efforts to work through these tensions led to improved relationships and communication but no new ways of working were identified so the balance between education and training did not shift in any real sense within the hospital structures.

Paradox theory provides a framework for considering opposing viewpoints and incompatible positions in the social context of an organization and raising awareness of their co-existence (i.e., making latent tensions visible). By doing so affirms opposing tensions as equally valid and can be a means of encourage constructive "both/and" responses.[66,67,73,] Put simply, thinking with a paradox mindset allows people to confront tensions, scrutinise inherent contradictions and find creative ways in which competing demands can be met. Specific types of paradox operate and interact across micro-, meso and macro- levels and different approaches to managing paradoxical tensions have been proposed.[74] These are performing, organising, belonging and learning, each of which has different implications in terms of providing relief from a tension and potential for progress (for more detail Table 3 in the supplementary materials for this paper: reproduced with permission from Cleland et al.[40]). Recent studies have also taken a process-based perspective to indicate how paradoxes and coping with them evolves over time and are embedded in organization structure.[75]

Applying paradox theory to medical education research

Researchers have applied a paradox lens to phenomena as varied as identity[76], innovation[77], governance[72], leadership[78], as well as parts–whole tensions and systemic contradictions within organizations.[79] These are all relevant areas within medical education research. As an example of the last, consider the tensions between a medical school and its host university. The pressures on the overarching organization may be different from those on the medical school which is typically subject to additional external regulation. How do the actors and structures in the medical school respond to organizing tensions like empowerment and control, and belonging tensions in terms of balancing being part of a collective system (the university) with the wider reference group of medical schools in their context?

Paradox is a particularly useful approach to examine change processes.[70] We have referred to some common change processes in medical education earlier but here we draw on a more general example. Universities regularly review internal structures and restructure to improve efficiency and effectiveness, redistribute power and drive innovation.   During

restructuring, new goals are established, roles altered, and relationships between actors redefined.[80] Tensions occur between the old and the new goals, roles and relationships at different levels.[67, 70] Paradoxes of performing arise at the microlevel, as individuals struggle to respond to either the conflicting demands embodied within their own roles or the roles of others with whom they share joint tasks.[66] Paradoxes of belonging occur at the meso-level as different groups embody different values, beliefs, and identities, shaking up group memberships and loyalties.[80] The final paradox is that of learning as restructuring is usually accompanied by new procedures and frames of reference.[79, 81,] Paradox theory can be used to make invisible tensions at different levels visible, to examine responses and encourage adjusting responses, and to study how a tension at one level may have effects at another level.[66, 87]

Management studies indicate that context is relevant to the management of organizational paradoxes. Given this, comparative studies could look at how medical schools and individuals working in medical schools respond to the same paradoxes (e.g., shifting from the apprenticeship model of learning to CMBE), and how these responses are related to external (economic, socio-cultural, legal, etc.) and internal (resources, process, values, etc.) factors.

Complexity Leadership Theory

CLT is a relatively new approach which regards 'leadership' as a collective process arising from interactions between individuals, groups and contexts rather than because of a discrete role allocated to an individual or an individual's capacities. [22, 83, 84]CLT's focus is the '*dynamic (changing, interactive and temporal) informal interactive patterns that exist in and among organizational systems*',[43:p214] a focus that illustrates CLT's foundations in complexity theory's notion of interconnectivity. In this framework, leadership is fundamentally a system phenomenon - the product of interactions and tensions (which can be both human and non-human) that generate learning and new outcomes.[22, 43, 85-88,] As such, leadership

(and with it change) can occur anywhere within a system when individuals interact over time to produce adaptive outcomes.

Uhl-Bien and colleagues propose three broad functions of leadership within a CLT perspective.[43, 85] First, *operational leadership* is grounded in traditional hierarchies within an organization, which focus on function, task, order, regulation and prescribed organizational outcomes.[43, 84] An important role of operational leadership is to translate and embed ideas and innovation in the structures of the organization.[43] Second is *entrepreneurial leadership*, which tends to operate at a local level, but also at multiple levels within organizations and systems and in interconnected ways. Entrepreneurial leadership refers to the adaptation, innovation and learning (or emergence) that occurs in response to 'tensions' and new challenges.[43, 84] It is often seen as informal and based on interactions rather than an act of power or authority.[43, 84] Finally, *enabling leadership* works to both facilitate the emergence and adaptation that occurs through entrepreneurial leadership and to manage the connections within the organization.[43, 84] In other words, enabling leadership will create an environment in which innovation and adaptation can occur whilst ensuring that there is flow of new knowledge throughout an organizational structure to other systems and administrative structures.[43, 84] See Figure 1 for a visual summary of these three functions.

[Insert Figure 1 around here]

CLT provides a framework for exploration of change at micro-, meso- and macro- levels.[84] Research using CLT could focus on the interaction between agents (e.g. the intersection between operational and enabling leadership) as through this we can connect and develop understanding of the means in which change occurs at a local and organizational level.[84] It also may help us explain why change may or may not be successful. For example, CLT principles have been used to track changes in behaviours and services in public health nursing.[88] The authors argued that leadership within this system depended on several factors including: interaction and involvement of members in reflective practices, planning

and decision-making; the number of cross organizational relationships each local system had; the ability to communicate change and innovation throughout an organization; and the level of 'boundary spanning' that occurred in which group members would link with others building relationships and 'bridges' for the flow of information (i.e. enabling leadership).

Applying CLT in medical education research

As we have previously explained, to date and to our knowledge, there are no examples of use of CLT as an explanatory lens for analysis of change in medical education. A contemporary example for where CLT could be applied would be to help explore and explain the processes involved in implementing Interprofessional Education (IPE). Shifting to Interprofessional practices and the corresponding obligation placed on educational institutions to implement IPE is seen as vital to meet global workforce challenges, highly complex healthcare needs and increasingly constrained budgets.[89-91] A recent meta-synthesis exploring student, educator and service user perspectives on interprofessional placements (as part of IPE), found: issues with limited understanding of learning processes; implementation relying on individuals (therefore potential issues with sustainability); and a lack of understanding around the purpose of the placements and their roles within it.[92]

Through exploring the networks and connections between different levels within the system using CLT, it may be possible to identify and track how the implementation of IPE placements (done through operational leadership) is being received adapted for suitability at a local level. These adaptations may be done through entrepreneurial leadership. Perhaps most importantly and to address the concerns highlighted in this meta-synthesis, it may be pertinent to identify, track and explore enabling leadership through asking how enabling leadership facilitates connection between operational and local levels regarding understanding of and reasoning behind IPE placements? One could also ask how enabling leadership facilitates sustainability of innovations (rather than relying on individuals) at a local level through connections between local systems and the wider organisations. Alternatively, it could be suggested through CLT that identifying a lack of presence of

enabling leadership may cause disconnect between multiple levels within an organization and ultimately cause change (in this instance the implementation on IPE placements) to fail. Locating (or not locating) enabling leadership within a medical education system and possibly developing enabling leadership capabilities within the system could be a focus for interventional study.

Considering theory critically

As with all theories, we must acknowledge that there will be limitations to the explanatory power of IL, paradox and CLT. Each theory, or group of theories, is at a different stage in its evolution. Paradox theory and related empirical work has progressed and diversified since it was first proposed some 35 years ago[42], and IL is well established in organisational studies having been first proposed 30 years ago.[41] However, research on CLT is in very early stages across all disciplines and more study is needed to establish the value of CLT as a critical explanatory lens for seeing leadership as an emergent 'organizational phenomenon'.[93:p233] Reflecting this, CLT is, to the best of our knowledge, novel to medical education and medical education research (MER). Indeed, IL and paradox theory have been used but only in isolated, studies and further research is required to establish use of these theories within our field.[40, 63]

Additionally, IL has been critiqued for its ethnocentric nature, having been developed to explore Westernised organisations and their focus reveals one way of seeing things- it is therefore essential that contexts (local and national) are considered when using this perspective.[94] IL can also be selective in nature, why choose to explore certain logics and not others and focus 'ideal types' of logics?[45] Researcher reflexivity is essential here in order to identify and explain what is (and isn't) explored.[95] Finally, IL has been criticised for its tautological approach (i.e. the use of a multiplicity of terms that often mean the same thing), it is therefore essential that researchers maintain clarity of explanation when reporting using this lens of analysis.[96, 97]

The strength of paradox theory is that it provides a way for considering opposing viewpoints and incompatible positions, and so can be used to make latent tensions visible. However, it does not provide a framework to assist with addressing paradox – those interesting in implementing change must look elsewhere in the literature for guidance on the "how to". In short, recognising the paradox is not sufficient in itself to lead to change. Second, research has predominantly examined organizational-level approaches to managing paradoxical tensions: there is a need to look more at individual and team levels of analyses to advance paradox theory. [e.g. 98] Linked to this, there is increasing interest in how some people approach competing demands with a mindset which allows them to manage complexity and be open to ambiguity whereas others may or may not have the knowledge, capacity (e.g., resources, time), social networks or mindset to seek out new and novel ways of working, preferring existing ways of doing things. [99, 100] Further research on how collective paradoxical frames develop from individual's frames is also called for in the literature. [98] Third, paradox research is dominated by case study methodology and often studies focus on one change within an organization. Future research with paradox theory may benefit from embracing more study designs and methodological approaches. Finally, there is also a paucity of research reporting on where a paradox approach to tensions has negative consequences although emerging evidence suggests that some conditions are appropriate for paradoxical leadership and mindsets, whereas others are not. [e.g.101] Other studies suggest that seeing tension as paradoxes can increase complexity and uncertainty, which may be detrimental in terms of action or commitment to a specific option. [102]

Some may argue that CLT has similarities to other leadership theories such as distributed leadership and transformational leadership.[93] However arguably, CLT brings opportunity to draw on more critical views of leadership which rely on a layer of emergence and construction through interaction. Thus roles (e.g. who the leaders and followers are) shift away from the assumption of reasonably stable roles and lines of leadership. [93] Therefore, CLT becomes a potential tool for understanding current and possible status and why change may work/not work rather than a frame for setting up stable systems of leadership. Critics suggest that CLT continues to rely on notions of leader-centric power to manage complexity

rather than complexity leadership. [93] Further research using CLT (and arguably developing the theory) is essential to advance this conversation.

Finally, and more generally, borrowing theory from other disciplines is not new in medical education but, as with any theory borrowing, it is critical to carefully consider the theory, and check its assumptions are congruent with the specific research question. [103, 104] The theories presented above acknowledge the interactions between macro and micro, or systems and people. If this is not your area of interest, then these theories may not be appropriate. Second, all theory illuminates certain aspects of data: different theories will emphasise different factors and outcomes and neglect other aspects.[105] For example, someone working from a different perspective may have considered how the sociological theories of fields and social network analysis could reconcile the micro-macro divide.[106-108] This would be perfectly valid and would add to the body of knowledge and understanding in a different way from the theories we suggest. Ultimately, theory choice, and hence what is illuminated, will be guided not just by the research question and data, but one's own training, knowledge and interests. We urge healthcare professions researchers to read widely and be open to, but scholarly in terms of critical assessment of, new theories from different fields.

Conclusion

The primary aim of this paper is to introduce organizational theories which have rarely been used in medical education research but which seem to have applicability given their focus on the interconnections between people and the system(s), and how the system(s) in turn impacts on individuals and groups. As Finkelstein, put it: "*I understand that as researchers we need to simplify very complex processes to study them carefully, but what are we left with when we remove the messiness, the back-and-forth, the reality?*".[109:p77] We hope that by drawing attention of readers to the potential of these theories we can unlock some of the complexity of medical education and open new avenues for research.

Acknowledgements

None

Conflict of Interest

None

Contributions

Both authors contributed to the conception of this work. Both authors contributed to drafting this paper and subsequent revisions of the draft. Both authors approved the final version of the manuscript.

Ethical Approval

Not applicable

References

1. Kotter J. Leading Change: Why transformation efforts fail. Harvard Business Review, 1995; 73(2): 59-67

2. Martin G, Siebert S. Managing Organisational Change. In: Martin G, Siebert S. *Managing People and Organizations in Changing Contexts.* Oxford: Routledge. 2016: 309-340

3. Finn F, Learmonth M, Reedy P. Some unintended effects of teamwork in healthcare, Social Science and Medicine. 2010; 70: 1148-1154

4. Touchie C, ten Cate O.The promise, perils, problems and progress of competency-based medical education. Medical Education. 2016; 50(1): 93-100 https://doi.org/10.1111/medu.12839

5. Gruppen LD, Burkhardt JC, Fitgerald JT, et al. Competency-based education: programme design and challenges to implementation. Medical Education. 2016; 50(5); 532-539 https://doi.org/10.1111/medu.12977

6. Sharifabadi AD, Clarking C, Doja A. Perceptions of competency-based medical education from medical student discussion forums Med Educ. 2019; 53(7): 666-676 https://doi.org/10.1111/medu.13803

7. McGaghie WC, Issenberg SB, Petrusa ER, Scalese RJ.A critical review of simulation-based medical education research: 2003–2009. Med Educ 2010;44 (1):50–63.

8. McGaghie WC, Issenberg SB, Barsuk JH, Wayne DB. A critical review of simulation-based mastery learning with translational outcomes. Med Educ 2014;48 (4):375–85.

9. Dawe SR, Pena GN, Windsor JA, Broeders JA, Cregan PC, Hewett PJ, Maddern GJ. Systematic review of skills transfer after surgical simulation-based training. Br J Surg 2014;101:1063–76.

10. Hawick L, Cleland J, Kitto S, 'I feel like I sleep here': how space and place influence medical student experiences. Med Educ; 2018; 52(10)

11. Fielding S, Tiffin PA, Greatrix R, et al. Do changing medical admissions practices in the UK impact on who is admitted? An interrupted time series analysis. BMJ Open. 2018; 8:e023274. doi:10.1136/ bmjopen-2018-023274

12. MacLeod A, Cameron P, Kits O, Tummons J. Technologies of Exposure: Videoconferences Distributed Medical Education as a Sociomaterial Practice, Academic Medicine. 2019; 94(3): 412-418

13. Bland, C. J., Starnaman, S., Wersal, L., Moorehead-Rosenberg, L., Zonia, S., & Henry, R. (2000, June). Curricular change in medical schools: How to succeed. Academic Medicine, 75, 575–594.

14. Thomas, P. A., Kern, D. E., Hughes, M. T., & Chen, B. Y. (2016). Curriculum development for medical education: A six step approach (3rd ed.). Baltimore, MD: Johns Hopkins University Press

15. Whitehead CR, Hodges BD, Austin Z. Captive on a carousel: discourses of 'new' in medical education 1910–2010. Adv Health Sci Educ. 2013;18:755–68.

16. Hawick L, Cleland JA, Kitto S. Getting off the Carousel: Exploring the Wicked Problem of Curriculum Reform. Perspectives in Medical Education 2017; 6: 337–343.

17. Bleakley A, Cleland JA. Sticking with messy realities: how 'thinking with complexity' can inform healthcare education research. In Cleland JA and Durning S. *Researching Medical Education*. Oxford: Wiley, 2015: 81-92.

18. Doolen T, Hacker M, Van Aken E. The impact of organizational context on work team effectiveness: A study of production team. Engineering Management, IEEE Transactions on. 2003; 50: 285 - 296. 10.1109/TEM.2003.817296.

19. Sundstrom E, De Meuse K, Futrell D. Work teams: Applications and effectiveness. American Psychologist. 1990; 45: 120-133.

20. Zheng W, Yang B, McLean G. Linking Organizational Culture, Structure, Strategy, and Organizational Effectiveness: Mediating Role of Knowledge Management. Journal of Business Research. 2010; 63: 763-771.

21. Fridrich A, Jenny GJ, Bauer GF. The Context, Process, and Outcome Evaluation Model for Organisational Health Interventions. Biomed Res Int. 2015: 414832. doi:10.1155/2015/414832

22. Marion R, Uhl-Bien M. Leadership in complex organisations. The Leadership Quarterly. 2001; 12: 389-418.

23. Horton R. A new epoch for health professions education. The Lancet. 2010; 376, Issue 9756: 1875-1877.

24. Cleland J, McKimm J, Fuller R, Taylor D, Janczukowicz J, Gibbs T. Adapting to the impact of COVID-19: Sharing stories, sharing practice. Medical Teacher 2020. Published online 13 May https://www.tandfonline.com/doi/full/10.1080/0142159X.2020.1757635

25. Haggis T. Beyond 'mutual constitution': looking at learning and context from the perspective of complexity theory. In: Edwards R, Biesta G, Thorpe M. (eds). *Rethinking Contexts for Learning and Teaching: Communities, Activities and Networks.* London: Routledge. 2009: 44–60.

26. Bleakley A. Blunting Occam's razor: aligning medical education with studies of complexity. Journal of Evaluation in Clinical Practice. 2010; 16: 849–855.

27. Drucker P F. *Managing in the Next Society*, Oxford, London, New York: Butterworth Heinemann. 2002

28. Lipsitx LA. Understanding health care as a complex system: the foundation for unintended consequences. JAMA. 2012; 308(3): 243-4. doi: 10.1001/jama.2012.7551

29. Braithwaite J, Churruca K, Ellis LA, et al. *Complexity Science in Healthcare–Aspirations, Approaches, Applications and Accomplishments: A White Paper.* North Ryde: Australian Institute of Health Innovation, Macquarie University. 2017.

30. Glouberman S, Zimmerman B. Complicated and complex systems: What would successful reform of Medicare look like? In: Forest PG, Marchildon GP, McIntosh T (eds). *Changing Health Care in Canada: The Romanow Papers, Volume 2.* Toronto, CA: University of Toronto Press. 2004.

31. Pslek PE, Greenhalgh T.The importance of complexity in healthcare. British Medical Journal, 2001; 323: 625- 628.

32. Cristancho S, Field E, Lingard L. What is the state of complexity science in medical education research? Medical Education. 2019; 53(1): 95-104

33. Plowman DA, Duchon D. Dispelling the myths about leadership: from cybernetics to emergence. In: Uhl-Bien M, Marion R. *Complexity Leadership Part 1: Conceptual Foundations.* Charlotte NC: Information Age Publishing. 2008; 129- 154.

34. Johns G. The Essential Impact of Context on Organizational Behaviour. Academy of Management Review. 2006; 31(2). https://doi.org/10.5465/amr.2006.20208687

35. Finn R, Currie G, Martin G, Teamwork in context: Institutional mediation in the Public-service bureaucracy. Organization Studies. 2010; 31(8): 1069-1097

36. Bates J, Elleway R. (2016) Mapping the dark matter of context: a conceptual scoping review. Medical Education. 2016; 50(8): 807-816

37. Greenhalgh T. Complexity theory and family medicine: a new symbiosis. Swiss J Family Med 2009;331 (1).

38. Pasmore, B. (2015). Leading continuous change: Navigating churn in the real world. Oakland, CA: Berrett-Koehler.

39. Martin G, Bushfield S, Siebert S, Howieson B. Changing logics in healthcare and their effects on the identity motives and identity work of doctors. Organization studies. 2020 [published online]: https://doi.org/10.1177/0170840619895871

40. Cleland JA, Roberts R, Kitto S, Strand P, Johnston PJ. Using paradox theory to discern responses to service-training tensions in general surgery. Med Educ. 2018; 52 (3): 288-301

41. Friedland R, Alford R. Bringing society back in: Symbols, practices, and institutional contradictions. In: Powell WW, DiMaggio PJ (eds) *The New Institutionalism in Organizational Analysis.* Chicago, IL: University of Chicago Press. 1991: 232–263.

42. Guilmot N, Ehnert I. 27 years of research on organizational paradox and coping strategies: A review. In XXIVe Conférence Internationale de Management Stratégique. 2015

43. Uhl-Bien M, Marion R, McKelvey B. Complexity Leadership Theory: Shifting leadership from the industrial age to the knowledge era. In: Uhl-Bien M, Marion R. *Complexity Leadership Part 1: Conceptual Foundations*. Charlotte NC: Information Age Publishing. 2008: 185- 224.

44. Belrhiti Z, Nebot Giralt A, Marchal B. Complex leadership in healthcare: a scoping review. Int J Health Policy Manag. 2018;7(12):1073–1084. doi:10.15171/ijhpm.2018.75

45. Thornton PH, Ocasio W, Lounsbury M. *The Institutional Logics Perspective: A New Approach to Culture, Structure and Process.* New York: Oxford University Press. 2012

46. Gordon, L., Rees, C., Ker, J. Cleland J. Using video-reflexive ethnography to capture the complexity of leadership enactment in the healthcare workplace. Adv in Health Sci Educ 2017; 22: 1101–1121. https://doi.org/10.1007/s10459-016-9744-z

47. Gordon L, Rees CE, Jindal-Snape D. Doctors' identity transitions: Choosing to occupy a state of 'betwixt and between' Med Educ. 2020;00:1–13. https://doi.org/10.1111/medu.14219

48. Scanlan G, Cleland JA, Johnston PJ, Walker K, Does Perceived Organizational Support Influence Career Intentions? The Qualitative Stories Shared by UK Early Career Doctors. BMJ Open 2018;8:e022833.

49. Martin GP, Learmonth M. A critical account of the rise and spread of 'leadership': The case of UK healthcare. Social Science & Medicine. 2012; 74: 281-288.

50. Kirkpatrick I, Kuhlmann E, Hartley K, Dent M, Lega F. Medicine and management in European hospitals. BMC Health Services Research. 2016; 2(16): 7–14.

51. Reay T, Goodrick E, Waldorff SB, Casebeer A. Getting leopards to change their spots: Co-creating a new professional role identity. Academy of Management Journal. 2017; 60(3): 1043–1070.

52. Kyratsis Y, Atun R, Phillips N, Tracey P, George G. Health systems in transition: Professional identity work in the context of shifting institutional logics. Academy of Management Journal. 2017; 60(2): 610–641.

53. Goodrick E, Reay T. Constellations of institutional logics: Changes in the professional work of pharmacists. Work and Occupations. 2011; 38: 372–416.

54. Greenwood R, Raynard M, Kodeih F, Micelotta ER, Lounsbury M. Institutional complexity and organizational responses. The Academy of Management Annals. 2011; 5: 317–371.

55. Zilber TB. Institutional logics and institutional work: Should they be agreed? In: Lounsbury M, Boxenbaum E (Eds.), Institutional logics in action, Part A (Research in the sociology of organizations). Bingley, UK: Emerald Group Publishing Limited. 2013: 77–96.

56. Currie G, Spyridonidis D. Interpretation of multiple institutional logics on the ground: Actors' position, their agency and situational constraints in professionalized contexts. Organization Studies. 2016; 37: 77–97

57. Andersson T, Liff R. Co-optation as a response to competing institutional logics: Professionals and managers in healthcare. Journal of Professions and Organization. 2018; 5(2); 71–87, https://doi.org/10.1093/jpo/joy001

58. Scott WR, Ruef M, Mendel PJ, Caronna CA. Institutional change and healthcare organizations: from professional dominance to managed care. Chicago: University of Chicago Press. 2000

59. Reay T, Hinings CR. Managing the rivalry of competing institutional logics. Organization Studies. 2009; 30: 629–652.

60. Reay T, Jones C. Qualitatively capturing institutional logics. Strategic Organization. 2016; 14:441–454.

61. Fincham R, Forbes T. Three's a crowd: The role of inter-logic relationships in highly complex institutional fields. British Journal of Management. 2015; 26: 657–670.

62. Dunn MB, Jones C. Institutional logics and institutional pluralism: The contestation of care and science logics in medical education 1967-2005. Acad Med. 2010; 55(1); 114-149 https://doi.org/10.2189/asqu.2010.55.1.114

63. Varpio L, O'Brien B, Hu W, et al. Exploring the institutional logics of health professions education scholarship units. Med Educ. 2017; 51: 755–767. doi: 10.1111/medu.13334

64. Kahlke R, Varpio L. Positioning the work of health professions education scholarship units: How Canadia directors harness institutional logics within institutional orders to convey unit legitimacy. Acad Med, 2019; 94(12): 1988-1994

65. Cleland JA, Durning SJ. Education and service: how theories can help in understanding tensions. Med Educ. 2019; 53: 42-55.

66. Lewis, M. W. (2000) "Exploring Paradox: Toward a More Comprehensive Guide," Academy of Management Review 25: 760–76.

67. Eisenhardt KM. Paradox, Spirals, Ambivalence: the New Language of Change and Pluralism. Academy of Management Review. 2000; 25(4): 703-705.

68. Park S, Sturman MC. Evaluating form and functionality of pay-for-performance plans: The relative incentive and sorting effects of merit pay, bonuses, and long-term incentives. Human Resource Management. 2016; 55(4): 697–719

69. Luscher LS, Lewis MW. Organizational change and managerial sensemaking: Working through paradox. Academy of Management Journal. 2008; 51(2): 221–240.

70. Schad J, Lewis MW, Raisch S and Smith WK. Paradox research in management science: Looking back to move forward. Academy of Management Annals. 2016; 10(1): 5-64.

71. Sundaramurthy C, Lewis MW. Control and collaboration: Paradoxes of governance. Academy of Management Review. 2003; 28(3): 397-415

72. Lewis MW and Smith WK. Paradox as a metatheoretical perspective: Sharpening the focus and widening the scope. Journal of Applied Behavioral Science. 2014; 50(2): 127-149.

73. Poole MS, van de Ven AH. Using Paradox to Build Management and Organization Theories. Academy of Management Review. 1989; 14(4): 562–78.

74. Jarzabkowski P, Le JK, Van de Ven AH. Responding to competing strategic demands: how organizing, belonging, and performing paradoxes coevolve. Strat Org. 2013;11 (3):245

75. Fiol CM. Capitalizing on paradox: The role of language in transforming organizational identities. Organization Science. 2002; 13(6): 653-666.

76. Andriopoulos C, Lewis MW. Exploitation-Exploration Tensions and Organizational Ambidexterity: Managing Paradoxes of Innovation. Organization Science. 2009; 20(4): 696-717

77. Smith WK, Tushman ML. Managing strategic contradictions: A top Management Model for managing Innovation Streams. Organization Science. 2005;16(5): 522-536.

78. Clegg SR, Cunha JV, Cunha MP. Management Paradoxes: A relational view, Human Relations. 2002; 55(5): 483-503.

79. Seo MG, Putnam LL, Bartunek JM. Dualities and Tensions of Planned Organizational Change. In: Poole MS, Van de Ven AH (eds) Handbook of Organizational Change and Innovation. New York: Oxford University Press. 2004: 73–107.

80. Beech N, Burns H, de Caestecker L, MacIntosh R, MacLean D. Paradox as invitation to act in problematic change situations. Human Relations. 2004; 57: 1313-1332

81. Wenzel M, Koch J, Cornelissen JP, Rothmann W, Senf NN. How organizational actors live out paradoxical tensions through power relations: The case of a youth prison. Organizational Behavior and Human Decision Processes. 2019; 155: 55-67.

82. Cao Q, Gedajlovic E, Zhang H. Unpacking Organizational Ambidexterity: Dimensions, Contingencies, and Synergistic Effects. Organization Science. 2009; 20: 781–96.

83. Uhl-Bien M, Ospina SM. Advancing Relational Leadership Research: A dialogue among perspectives. Charlotte, NC: Information Age Publishing. 2012

84. Uhl-Bien M, Arena M. Complexity leadership: Enabling people and organizations for adaptability. Organizational Dynamics. 2017; 46(1): 9–20. https://doi.org/10.1016/j.orgdyn.2016.12.001

85. Marion R, Uhl-Bien M. Leadership in complex organisations. The Leadership Quarterly. 2001; 12: 389-418.

86. Uhl-Bien M, Pillai R The romance of leadership and the social construction of followership. In: Shamir B, Pillai R, Bligh MC, Uhl-Bien M (eds). Follower-centered Perspectives on Leadership: A tribute to the memory of James R Miendl. Greenwich, Connecticut: Information Age Publishing. 2007: 187- 210.

87. Hazy JK, Uhl-Bien M. Towards operationalizing complexity leadership: How generative, administrative and community-building leadership practices enact organizational outcomes. Leadership. 2015; 11(1): 79–104. https://doi.org/10.1177/1742715013511483

88. Rowe A, Hogarth A. Use of complex adaptive systems metaphor to achieve professional and organizational change. Journal of Advanced Nursing. 2005; 51(4): 396- 405

89. Patel KD, Reeves S. Interprofessional collaboration for a health system in crisis. NEJM Catalyst 2018. https://catalyst.nejm.org/health-system-crisis-interprofessional-education [Accessed 11/02/20]

90. World Health Organization. Framework for Action on Interprofessional Education and Collaborative Practice. Geneva: WHO. 2010.

91. Kent F, Hayes J, Glass S, Rees CE. Pre-registration interprofessional clinical education in the workplace: a realist review. Med Educ. 2017;51(9):903–17

92. O'Leary N, Salmon N, Clifford A, O'Donaghue M, Reeves S. 'Bumping along': a qualitative meta-synthesis of challenges to interprofessional placements. Med Educ. 2019; 53(9): 903–915. doi: 10.1111/medu.13891 O'Leary et al 2019

93. Touresh D. Is Complexity Leadership Theory Complex Enough? A critical appraisal, some modifications and suggestions for further research. Organization Studies. 2019; 40(2): 219–238. doi: 10.1177/0170840618789207

94. Jacks T. Institutional Logics: The Next Big Challenge for Information Systems Cross-Cultural Research? Journal of Global Information Technology Management. 2017; 20(1); 1-7, DOI: 10.1080/1097198X.2017.1280310

95. Attia M, Edge J. Be(com)ing a reflexive researcher: a developmental approach to research methodology, Open Review of Educational Research. 2017; 4(1); 33-45, DOI: 10.1080/23265507.2017.1300068

96. Alvesson M, Spicer A. Neo-institutional theory and organization studies: A mid-life crisis? Organization Studies. 2019; 40: 199–218

97. Friedland R, Arjaliès D, X-Institutional Logics: Out or In? 2019: June 11, 2019. Available at SSRN: https://ssrn.com/abstract=3403131 or http://dx.doi.org/10.2139/ssrn.3403131 [Accessed online 17th June 2020]

98. Waldman DA, Putnam LL, Miron-Spektor E, Siegel D. The role of paradox theory in decision making and management research. Organizational Behavior and Human Decision Processes. 2019; 155: 1-6.

99. Hahn T, Preuss L, Pinkse J, Figge F. Cognitive frames in corporate sustainability: managerial sensemaking with paradoxical and business case frames, Academy of Management Review. 2014; 39(4): 463-487.

100. Miron-Spektor E, Ingram A, Keller J, Smith WK, Lewis MW. Microfoundations of organizational paradox: the problem is how we think about the problem, Academy of Management Journal. 2019; 62 (1): 26-45.

101. Shao Y, Nijstad B, Tauber S. Creativity under workload pressure and integrative complexity: The double-edged sword of paradoxical leadership. Organizational Behavior and Human Decision Processes. 2019; 155: 7-19 https://doi.org/10.1016/j.obhdp.2019.01.008.

102. Calic G, Helie S, Bontis N, Mosakowski E. Creativity from paradoxical experience: A theory of how individuals achieve creativity while adopting paradoxical frames. Journal of Knowledge Management. 2019; 23(3): 397-418 https://doi.org/10.1108/JKM-03-2018-0223.

103. Murray JB, Evers DJ. Theory borrowing and reflectivity in interdisciplinary fields. In: Srull TA, ed. Advances in Consumer Research Volume 16. Provo, UT: Association for Consumer Research 1989;647–52

104. Varpio L, Martimianakis MA, Mylopoulos M. Qualitative research methodologies: embracing methodological borrowing, shifting and importing. In: Cleland J, Durning SJ, 2015. Researching Medical Education. Wiley:Oxford, 245-256

105. Bordage G. Conceptual frameworks to illuminate and magnify. Med Educ, 2009; 43(4): 312-319 doi: 10.1111/j.1365-2923.2009.03295.x.

106. Granovetter, M. The strength of weak ties: a network theory revisited. Sociological Theory. 1982; 1: 201–233.

107. Alexander JC, Giesen B, Munch R, Smelser NJ. The Macro-micro link. Berkeley, California: University of California Press, 1987

108. Turner JH. Principles of inter-societal dynamics. Journal of World Systems Research. 2017; 649-677

109. Finkelstein, S. Planning in organizations: One vote for complexity. In: Yammarino F, Dansereua F (eds.), Multi-level Issues in Organizational Behaviour and Processes. Bingley, UK: Emerald. 2002: 73–80.

Table 1. Overview: the three theories, what they emphasise, their utility and some examples of possible research questions in medical education that each theory could address.

Theory	Key principles and themes	Examples of possible research questions
Institutional logics[41]	Logics are 'societal ways of ordering reality'- revealed through symbols, practices, assumptions, values and beliefs. Multiple Logics will co-exist and can complement each other or compete. At times one logic may be dominant over other and this will be revealed through interactions.	Can change be facilitated by reinterpreting the institutional logics of service and education and their relationships? Exploring how the multiple logics of professional associations are enacted within and alongside healthcare organization logics at a local level. Comparing the dominant logics of CBME versus local dominant logics (to reveal what aspects of the introduction and implementation of CBME might meet resistance lead to unintended consequences) How are the logics of CBME shifted to make them contextually relevant?
Paradox theory[42]	Tensions within organizations are latent until times of change or disruption at which point, they	How do individual and organizational levels of identity interact at times of change?

	become visible	How do medical schools grapple with tensions between outside-inside, new-old and/or academic freedom-corporate responsibility?
	Organizational tensions cannot be resolved or circumvented but need to be managed constructively	
		What tensions arise at times of curriculum reform or organizational change/ restructuring, and how can these be addressed?
	Different approaches to managing paradoxical tensions have different implications in terms of providing relief from a tension and potential for progress	
		How do different medical schools and individuals working in different medical schools respond to the same paradoxes?
Complexity Leadership Theory[43]	Leadership is a system phenomenon and is grounded in interconnectivity and interaction and tensions between multiple systems and levels within an organisation.	How does enabling leadership facilitate connection between operational and local levels when IPE placements are being introduced?
	Three types of leadership exist – operational, entrepreneurial and enabling leadership. These leadership processes are interconnected and mutually reliant on each other.	How is innovation in learning, teaching and assessment in the workplace shared and adopted cross organisationally?
		What are the consequences of a lack of enabling leadership when implementing IPE?

Table 2: Key features of healthcare ILs (adapted from Reay et al, 2017 [52]; Krystatis et al 2017 [53]).

Logic	Key features
Professional	• Expert knowledge • Autonomous practice • High quality care as established by professional bodies
Market	• 'Supply and demand' will govern what service is required and delivered • Service users will establish what high-quality means
Corporate	• Managers will set systems of rules and the types of services offered (through bureaucratic means) • Targets for quality are set and imposed through managerial direction and monitoring
State	• Political priorities will shape and govern services • Targets for quality are set and imposed through legislation and senior management.
Care	• Draws attention to and fosters the view that service users should be seen as a whole through community-based preventative health and social care strategies • Moves away from the medical model of the 'patient' who is treated in a hospital

Figure 1: Complexity Leadership Theory (adapted from Uhl-Bien et al and Uhl-Bien and Arena). [43, 84]

Enabling Leadership: facilitating interconnectivity

Operational leadership: traditional hierarchies

Entrepreneurial Leadership: innovation within local systems at multiple levels in organisation