Thinking Sociomaterially: Why Matter Matters in Medical Education

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Abstract

Sociomaterial perspectives in research are those that encourage researchers to focus their inquiry on the relationships between people (social) *and* things (material), rather than focusing solely on people. The unique possibility of sociomaterial perspectives is increasingly recognized in health professions education scholarship.

In an effort to support those who may be interested in engaging with the principles of sociomaterialism in their own work, the authors have developed a primer on this paradigm of research. This Invited Commentary—one of several exploring different philosophies of science—offers an overview of the ontological, epistemological, axiological, and methodological foundations of sociomateriality. The authors then put these ideas into action, highlighting the philosophical foundations of sociomaterial perspectives in a sample case study that tells the story of Lee, a resident involved in a medical error.

Editor's Note: This article is part of a collection of Invited Commentaries exploring the Philosophy of Science.

> The point is that material things are performative and not inert; they are matter and they matter.
> —Tara Fenwick and Richard Edwards[1]

Educating doctors is an intricate and convoluted challenge. Our work relies on an array of people and things, and our field is replete with tools, technologies, ideas, expertise, and guidelines. Some of us are health professionals—but we are not all the same type of health professional. Some of us are scientists—but we are not all the same type of scientist. We are all teachers—but we all approach education from different perspectives. We do our work in classrooms and clinics, operating suites and community centers, rural family doctor's offices, and urban teaching hospitals. We use our eyes and ears, even sometimes our intuition; but we also use cellphones, notebooks, cadavers, stethoscopes, laptops, and textbooks. Some of us even use lasers and million-dollar highly engineered, haptic-enabled simulators.

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While people are certainly the central focus of medical education, our work is more than purely a human endeavor. In its simplest form, we may describe medical education as the process of educating physicians; however, we recognize that it requires, in fact, a network of humans and nonhumans coming together to accomplish things. Some of the things we accomplish are intended (e.g., candidates successfully passing licensing exams), but some of the things we accomplish are *not* intended (e.g., increasing numbers of graduates not matching to their desired residency program). How do we conduct our scholarly work in a manner that acknowledges the diversity of humans and nonhumans involved in medical education? We believe that sociomaterial approaches are a way forward.

The Sociomaterial (Paradigm)

Sociomateriality is an umbrella term for a set of research approaches that "share a common interest in decentering the human as the focus of study to allow for a deeper exploration of the complex, messy and non-linear relationships between materials and social practices."[2] Researchers operating from a sociomaterial approach therefore foreground the importance of materiality (in other words, nonhuman things) and explore the relations between people and things within medical education.

Sociomateriality is not a paradigm in the traditional sense—it is not like those identified by Guba and Lincoln[3] in 1994. However, staying with Guba and Lincoln,[3] the definition of paradigm is a "*worldview* that defines, for its holder, the nature of the 'world,' the individual's place in it, and the range of possible relationships to that world and its parts."[3] As sociomateriality evolved, Denzin and Lincoln positioned such new materialisms as "a new paradigm … on the horizon,"[4(p8)] one that broadly fits within the interpretive tradition.

Sociomaterial research in medical education has increased to include studies that (1) critique the taken-for-granted assumptions of comparability of distributed medical education[5,6] or (2) trace the checklist and its translations (and ruptures) across nodes within the network of objective structured clinical examination practices.[7] Others have explored interprofessional assemblages within the clinical workplace.[8–10] We believe the basic beliefs underpinning sociomateriality are therefore worth unpacking, and we do so in the following sections. For a list of terms and definitions related to sociomateriality, see Table 1; for a list of recommended resources on the topic, see Box 1.

Ontology: The nature of reality

What are the ontological principles, or ideas about the nature of reality, underpinning sociomateriality? Sociomaterialists believe the world—people, things, practices—is constituted through assemblages or heterogeneous entanglements of human and nonhuman elements. Hence, the assemblage is a central unit of analysis. We highlight 3 principles to consider with respect to the ontological foundations of sociomaterial

Table 1

Key Terms Related to the Research Paradigm of Sociomateriality

Term	Definition
Agency	The ability to act and/or exert power, which is distributed across networks to people and things
Assemblage	Heterogeneous—and constantly evolving—gatherings of natural, technological, human, and nonhuman actors
Emergence	Objects, and even individuals, are not preformed substances but rather surface through a series of negotiations between an ever-evolving assemblage of actors
Practice	Everyday sayings, doings, and relations with objects that make up what people do in their everyday lives
Symmetry	The idea that human and nonhuman actors should be equally considered in our analyses

approaches: emergence, agency, and symmetry.

Emergence. Sociomaterialists consider all things—objects, people, and practices—not as distinct, preformed entities, but rather as *emergent* through gatherings of natural, technological, human, and nonhuman actors.[11] The idea here is that the social and material are deeply entangled, even inseparable, and work together to produce the everyday world.[12] In other words, all things—human, nonhuman, or hybrid—are performed into existence, emerging as the result of activity and connections between people and things. In the context of medical education, this means that, rather than conceptualizing teaching and learning as distinct, individualized, human actions or as acts of cognition, we focus instead on unraveling the tangle of human and nonhuman relations that brought about the practice, activity, action, or phenomenon under study.

Agency. Agency, or the ability to act and/or exert power, is conceptualized as something that is not limited only to humans but is an attribute of "the ongoing reconfigurings of the world."[11(p818)] From this perspective, agency is seen as distributed across networks of people and things and as relational.[13] Rather than being considered the backdrop against which human activity takes place, things are considered productive—they can permit, preclude, inspire, discourage, authorize, influence, hinder, and much more.[1] This is not intended to sound ridiculous. Surely, an object—say an electronic health record (EHR)—does not act on its own, springing to life and willfully interfering with human productivity. However, many health professionals have had the experience of needing to access information in the EHR to participate in a patient meeting. If the EHR's interface makes it difficult to access lab reports or nursing notes, participation in the meeting is influenced. The EHR is not a neutral element to be used and controlled by humans. It is agentic.

Symmetry. Given sociomaterial perspectives on emergence and nonhuman agency, it follows that we consider nonhumans equally as productive and consequential as humans in our empirical work. Paying equivalent attention to both humans and nonhumans allows for detailed descriptions of the complexity of the practice or scenario under study. We refer to this equivalence between people and things as symmetry. It is important to clarify, however, that symmetry does not mean *identicalness* in sociomaterial approaches.[14] While we recognize that nonhumans exert force and have agency, this agency does not operate in the same precise ways in which human agency does. In other words, sociomaterialists do not equate agency with intent. Hence, sociomaterial research typically focuses on what happens rather than what is intended.

Epistemology: The nature of knowledge

Epistemology refers to the relationship between the knower and the known; however, sociomateriality by its nature tends not to separate epistemology and ontology. Within these perspectives, there is no separation between the knower and the known, primarily because agency is not the prerogative of humans alone.[4] Ontology and epistemology are intimately entwined, as "objects, events, identities and knowledge are understood to be performed into being through these social and material relations."[15] As a result, "matter and discourse are co-implicated in complex and shifting arrangements from which the world emerges."[16]

Despite this lack of separation, ideas about emergence, agency, and symmetry shape how we build knowledge in sociomaterial research practices. Our work as sociomaterialists involves exploring the ways in which human and nonhuman elements are assembling to hold in place the scenario under study. Rather than focusing on individual people or things, we trace the relationships between people and things and what is being accomplished through these relations—whether fleeting (a moment in time) or stable (a long-term practice).[17,18]

This onto-epistemological perspective influences the positioning of the researcher in sociomaterial studies. In more human-focused orientations, the work of the researcher is to document a set of social practices acknowledging that the data are constructed; that is, the social practices are constructed by the researcher and the participants (a human–human

Box 1

Recommended Reading on the Topic of Sociomateriality

Fenwick T. Sociomateriality in medical practice and learning: Attuning to what matters. Med Educ. 2014;48:44–52.

Orlikowski W. Sociomaterial practices: Exploring technology at work. Organ Stud. 2007;28:1435–1448.

Fenwick T, Nimmo G. Making visible what matters: Sociomaterial approaches for research and practice in healthcare education. In: Cleland J, Durning S, eds. Researching Medical Education. Sussex, UK: John Wiley & Sons; 2015:67–80.

construction). Certainly, the presence of a researcher influences those practices,[19] but they are largely conceptualized as separate from the researcher.

In contrast, sociomaterial epistemologies position the researcher's role as documenting—whether in text, photograph, or some other form—a nonstatic assemblage of people and things. A key difference here is that the researcher (and the recording equipment, notes, memos, etc.) is considered a constitutive and productive element of the assemblage under study. In other words, the researcher is an actant/node within the assemblage, and therefore, the assemblage we are studying does not exist independent of the researcher. As observers we do not seek objectivity or erase distance from the observed. Instead we ask, what kind of distance is needed between the researcher and the object of research, and to what end? The act of collecting data involves dynamic engagement with the world being observed. The research gaze is "situated in already existing practices of social power."[20(p528)] This onto-epistemological positioning of the researcher within the phenomenon means that the researcher's actions are continuously working to produce—and reproduce—the phenomenon under study.[21]

Axiology: How values influence the research process

Axiology refers to the values and their related judgments associated with a particular paradigm. Given the sociomaterial onto-epistemological principles of emergence, agency, and symmetry, an important axiological consideration is the risk that human concerns, and even humanity, may be obscured in the interest of symmetry. While we acknowledge this risk, we concur with McLean and Hassard,[22] who described such a possibility as "symmetrical absurdity." The point of sociomaterial studies in the context of medical education is not to obscure human meaning, subjectivities, desires, and values from our analyses; instead, we recognize the important influences of nature, technology, and all manner of things that infuse and imbue humanity.

Another concern is related to the situated and emergent properties of sociomaterial approaches. While medical education has traditionally focused on the human side of education, there is much to be learned by foregrounding the productive role of material–human collectives. The value of sociomaterial research is in focusing on what is commonly excluded to gain purchase on complexity of the everyday world of medical education.

To richly understand the human–nonhuman relationships, we must acknowledge and theorize the active role of materiality. Medical education is fundamentally about people: preparing learners for work in medicine or preparing medical teachers for their teaching practices. When we conceptualize medical education as an assemblage of people and things that are continually assembling (and disassembling) in ways that are unpredictable and even uncontrollable, perspectives shift. The people involved in medical education are no longer assumed to be masterful and fully in control of the innumerable materials in their environments. Such a perspective allows us to understand how these variously distributed human and nonhuman materials collectively generate, consolidate, or resist power. When agency is understood to be relational and distributed—produced through webs of human and nonhuman assemblages—perhaps a more realistic, responsible, and responsive approach to medical education is possible.

Methodology: How research is conducted

How do sociomaterialists actually activate these ontological, epistemological, and axiological principles when it comes to exploring medical education? What are the research tools we choose to engage?

Traditionally, many methods used within medical education research have been "human centric" (e.g., interviews, surveys). Sociomaterial investigations, in contrast, begin from a place of symmetry. That means we recognize the field, or topic, of study as a social and material assemblage that is constantly emerging as the product of evolving negotiations and relationships between people and things.

A sociomaterial investigation begins generally by taking note of the fact that a material element is doing something—intended or not—that is worthy of our attention and inquiry. This material element could be anything: a simulation mannequin that makes students laugh, a busy PowerPoint slide that prevents detailed note taking, an overflowing garbage bin in a clinic that discourages proper disposal of waste, or any number of others. Whatever the element(s), once identified, our job is to find a way to unravel the various social and material elements that are producing the situation we are studying. And, while this sounds relatively straightforward, in practice, it can be quite a messy process, involving the collection and analysis of a variety of data points.

Sociomaterial methods often mirror those of ethnography[23] and can include any combination of analyzing documents and artifacts/objects, conducting observations, and interviewing. Generally speaking, researchers operating from a sociomaterial perspective spend a significant amount of time in the field, taking note of phenomena in natural settings. Our work is to follow—and document—the negotiations, compromises, and adaptations that come together, and come apart, to produce the everyday world of medical education. For example, we might seek to understand how particular policy documents or guidelines are enacted. Or, we might observe to understand how people and things come together through networks of relations to work around or tinker with the idealized descriptions of patient treatment guidelines when facing an actual patient.

Whatever the focus of our inquiry, we use a variety of tools to understand what *actually* happens rather than attempting to discern human motives or intent. The choice of methods to accomplish this is iterative and emergent.

The Case of Lee: A Sociomaterial Take

What does sociomateriality look like in practice? The case of Lee (Box 2) and the incorrect dosage of Narcan provides a practical example of how we might put sociomaterial ideas of emergence, agency, and symmetry to work.

Rather than focusing on Lee as an individual resident who makes an error, sociomaterialists begin by conceptualizing the scenario as emergent through an assemblage of

Box 2

Sample Case[a]

Lee was a resident assigned to monitor a postop patient. The patient had a periodically low respiratory rate and lower-than-normal pulse and blood pressure. Narcan was ordered on an "as needed" basis, to be given in doses of 0.2 mg intravenously. In checking the patient's vitals, Lee decided it was time to administer an intravenous (IV) dose of Narcan.

Once Lee injected the vial of Narcan into the IV port, Lee noticed it was labeled "2 milligrams per 1 milliliter (ml)"—the entire vial should not have been injected. Feeling panicky, Lee reported the mistake to an attending and rushed back to the patient's side to monitor the vital signs. Lee was surprised to find that the patient's vitals had come up to normal rates, and the patient was actually much more alert. When Lee reported this change to the attending surgeon and anesthesiologist, they told Lee to continue to monitor the patient closely, remarking that it may have been just what the patient needed.

Lee felt hugely relieved, but was still overwhelmed and very upset. In most cases, giving 10 times a normal dose of any medication could have led to extremely serious consequences, and even death. Still, Lee managed to remain outwardly composed and took the time to complete an incident report. At the end of the day, when Lee finally sat down to rest, the incident played over and over again. Lee did not sleep.

[a]This sample case is used throughout the Philosophy of Science Invited Commentaries to illustrate each research paradigm.

human and nonhuman actors. The assemblage, of course, includes Lee, but also an innumerable number of other contributing factors, including, for example: medical knowledge (normal vital signs, general paths), the vial of Narcan (an out of the ordinary amount of Narcan in the vial [2 mg rather than the typical 0.4mg], its shape and size, the label, the font), the room in which the scenario takes place (and all of the elements in the room, including furnishings, electricity, lighting, etc.), the tools used to administer the injection, the patient's body, the broad context in which Lee is working (demands of residency, feelings of self-doubt, a need to rush, etc.), and countless others. A researcher informed by sociomateriality looks at Lee's scenario from a position of symmetry, exploring the productive role of materials in bringing about the scenario described. What becomes quickly apparent is we are able to move beyond a place of individualization or blame (i.e., Lee did something bad) to a place of complexity (i.e., a variety of factors contributed to the scenario).

As described above, sociomaterial studies often begin by taking note of a material that seems to be *doing* or *causing* something. In this case, there are many agentic materials, but for the purposes of this example, we will focus on one specific element: the vial of Narcan itself. Lee seems to have misread, or perhaps overlooked the label on the vial of Narcan. Why? Was the room dark? Was the print small? Was there a distraction? Was Lee feeling pressed for time? Was the room uncomfortable?

How is the materiality of the vial of Narcan bringing about the scenario? To learn more, we may collect documents: perhaps incident reports like the one filed by Lee, but others may be relevant as well, including prescribing manuals, or perhaps learning objectives related to appropriate expectations around prescribing at Lee's stage of education. We may visit the room in which the error occurred, taking field notes to describe it, perhaps photographing it. We may shadow Lee engaged in everyday work, hoping to see how routine pressures might influence actions. We may interview Lee, or perhaps the patient (if possible), or a teacher—not to get their reactions to the scenario, or their feelings/ perceptions about it, but rather to try to better understand the contributory social and material actors. We may trace the vial of Narcan through the hospital system to understand the various nodes of translations (for service and education) and where ruptures may occur.

Whatever the combination of methods we choose, the aim is to move beyond a point of focusing on "human error" to illuminating the social and material complexity assembling to produce the scenario.

Conclusion

A sociomaterial sensibility decenters the human subject. Research within this paradigm theorizes medical education as expansive, unpredictable, and located in provisional networks of people, activities, and things rather than in individuals' heads or bodies. Conceptualizing education as something other than social, cognitive, or personal allows us to interrupt taken-for-granted ideas—and in those interruptions, we believe there is opportunity—for seeing, thinking, and doing things differently.

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