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## **Body pedagogics: embodied learning for the health professions**

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## Abstract

**Medicine as embodied practice:** Bodily dysfunctions bring patients to their doctors and even diseases of the mind can originate in patients' bodies. Doctors respond by using their own bodies – hands, eyes, ears, and even noses - to make diagnoses and treat disease. Yet, despite the embodied nature of practice, medicine typically treats the body as an object, paying scant attention to the subjective embodied experiences of patients and doctors. Much health professions education reflects this, prioritizing cognition over learners' sense of embodiment. There is a gap therefore between the embodied realities of practice and the disembodied nature of medical education. This article introduces readers to 'body pedagogics' as a framework that can help to re-establish embodiment as a central principle of health professions education.

**Body pedagogics (BP):** This embodiment theory, drawn from sociology, anthropology, and phenomenology, has informed such disparate educational fields as glass blowing and military training. BP emphasizes learning as a physical embodied process. It illustrates how multisensory experience causes embodied changes that become an automatic part of physician expertise. We introduce core BP concepts using physical examination as an example, examining the bodily means of health professions education, students' bodily experiences, and the resulting bodily changes.

**Implications:** BP can help us to focus attention on embodiment as a central principle of health professions education that transcends discipline-specific teaching of clinical skills. Moreover, it provides a set of conceptual foundations for an interdisciplinary practice within health professions education with implications for instructional design. BP can also help us to make strange the habits and disregarded aspects of embodied learning and in so doing it can help us to

consider embodiment more critically and directly in practice and education, and in the ways we research them.

## INTRODUCTION

Physicians' hands, eyes, ears, and noses play an integral role in diagnosing and treating disease. The sweet taste of urine, for example, led to the discovery of diabetes. Yet, despite the corporeal connections physicians form with patients, Western cultures tend to regard medicine as a practice of the mind. Health professions education reflects this dualist worldview. Students start their studies by dividing the body into systems, analysing the form and function of organs and cells, and reassembling cells, tissues, and organs layer by layer which positions the human mind, literally and metaphorically, above the body-object. Rendering patients' bodies inert, passive, abstract, and amenable to manipulation and control<sup>1,2</sup> makes empirical investigation possible. But it disconnects patients' bodies<sup>3</sup> from those of clinicians' and students',<sup>4,5</sup> whose physical responses and needs remain unattended.<sup>6</sup>

There is, also, a hierarchy in how Western society values the senses, typically prioritizing vision over others, an 'oculocentrism' that has its roots in Aristotle and Plato. The Enlightenment and subsequent development of the microscope, telescope, camera, and X-ray further raised the status of vision as a sense that could, more than any other, reveal the truth. Clinical educators, accordingly, tend to prioritize vision over 'less reliable' forms of sensory engagement such as auscultation and touch. Indeed, they have an uneasy relationship with these other sensory skills, the subjective nature of which often does not satisfy the burden of proof in making diagnoses.<sup>7</sup> It is also notable that the medical profession seems to be much less curious than nursing about touch in clinical practice<sup>8</sup> and has been quick to favour ultrasound over physical examination.<sup>9</sup> Redressing this imbalance between conception and perception opens up experiential and discursive spaces concerning the role of the senses in health professions education.

Some clinical educators, concerned with the impact of this disconnect on learners, have attempted to reconcile the objectified body with more personal and subjective human experiences. For instance, reflective practice,<sup>10</sup> narrative medicine,<sup>11</sup> visits to museums,<sup>12</sup> and other approaches to the medical humanities have been used to sensitize medical students to human dimensions of clinical experience. Useful and well-intended as these strategies are, as learning experiences they focus primarily on verbal, visual, and cognitive experiences while excluding tactile and other sensory experiences.

It is paradoxical that medical education so often treats the body as “*a brute fact of nature*”<sup>13</sup> when sociology,<sup>3, 14, 15</sup> anthropology,<sup>13, 16</sup> philosophy,<sup>17-19</sup> education,<sup>20, 21</sup> and neuroscience<sup>22, 23</sup> regard the body as a rich resource of human understanding. These disciplines use the term ‘embodiment’ to explore and describe how human bodies mediate the experiences of everyday life. Research in these fields examines the central place of the body in our interpretations of, and interactions with, our physical and social environments. From an embodiment perspective, the body is not a fixed, material entity, but a contested concept, situated within a variety of philosophical, historical, political, and societal frames shaped, for instance, by gender and race.<sup>24</sup>

Embodiment research has had limited applications in the field of health professions education. For example, ethnographers have immersed themselves, alongside students, in clinical skills laboratories and hospital wards,<sup>1, 25, 26</sup> to examine embodied practices such as learning to interpret heart and lung sounds<sup>1, 26</sup> and percuss patients’ bodies.<sup>25, 27-29</sup> These examples notwithstanding, the emerging discipline of ‘body pedagogics’,<sup>14, 30, 31</sup> which takes an educational perspective on embodiment, has not been robustly explored in health professions education. The conceptual frame of ‘body pedagogics’ (BP) has proved useful in sensory and physical education and in other disciplines including sport,<sup>32</sup> education,<sup>33</sup> religion,<sup>34</sup> military

training,<sup>35</sup> ballet dancing,<sup>36</sup> and glass blowing.<sup>37</sup> There is much to suggest then that BP could advance the scholarship of health professions education.

The aim of this paper is to introduce BP as a way of understanding and exploring embodied learning in health professions education. To do this, we draw core examples from the practices and experiences of conducting physical examination, as these require learners to explore and develop new means of sensory awareness. We believe our argument will redirect clinical teachers' attention to the central place of sensory learning in acquiring and developing clinical skills. We invite readers from different theoretical backgrounds to consider how their subject knowledge could inform an interdisciplinary practice of BP specific to health professions education. By uniting the applied and the theoretical, the individual and the social, we make a case for the re-embodiment of health professions education.

### **Body pedagogics (BP)**

The word pedagogics is synonymous with pedagogy, which refers to the principles and practice of education. BP refers specifically to the place of the human body in teaching and learning: *“the central pedagogic means through which a culture transmits its corporeal techniques, skills, and dispositions, the embodied experiences associated with acquiring or failing to acquire these attributes, and the embodied changes resulting from this process.”*<sup>14</sup> With its intellectual roots in Durkheim<sup>38</sup> and Weber<sup>39</sup> and in Maus's 'techniques of the body',<sup>40</sup> BP draws on Bourdieu's contribution of socially transmitted forms of embodiment<sup>41</sup> (sociology), Foucault's ideas of how power operates on the body,<sup>42, 43</sup> Ingold's work on enskillment<sup>44, 45</sup> (anthropology), Merleau-Ponty's focus on the essential structures of perception<sup>17</sup> (philosophy), and Dewey's consideration

of the relationship between thought, reflexivity, and embodied learning (education).<sup>46</sup> These thinkers, from different backgrounds and at different times, broadened conceptualizations of experience from the primarily cognitive focus described in Introduction towards a more holistic conceptualization, which brought bodily experience more clearly into focus. We articulate the scope of BP using Shilling's work,<sup>14, 30, 31, 34, 47</sup> as it draws on this broad interdisciplinary body of theory supported by compelling accounts from a range of practical disciplines. Shilling outlines three interconnected aspects of BP; institutional means, embodied experiences, and embodied outcomes. These concepts can be seen as a progression through one's learning as presented in Figure 1. We give examples of each in Table 1.

[FIGURE 1 HERE]

[TABLE 1 HERE]

### *Institutional means*

The initial analytical component of BP examines the various means through which institutions shape the bodily practices of their members.<sup>31</sup> Health professions education takes place in contexts that are often (although not always) designed to mediate learning or clinical practice, and that shape the embodied experiences of the learners and teachers within them. For instance, lecture theatres organize and direct lecturers and learners to certain physical dispositions; lecturers are required to stand while their learners sit, the lecturer is free to move around while their learners are afforded very little physical freedom, and so on.



Institutional means also encompass the relationships between contexts and the lessons and rituals that take place within them. These relationships tend to privilege certain learning outcomes and marginalize others. For example, traditionally, medical students first encountered the human body in the context of anatomy and pathology classes, where their sensory experiences were shaped by the physicality of embalmed bodies and hands-on dissections. Senses such as touch, weight, size, smell, and sound were woven into their experiences. However, as prosection has replaced dissection and virtual reality has displaced morbid reality, students' early sensory experiences have become increasingly 'oculocentric',<sup>48</sup> privileging what can be seen over other senses such as touch, hearing, and smell. Setting aside the question of whether a mono-dimensional sensory experience is the best way to learn material such as anatomy (perhaps the most literally embodied of the basic sciences), the experiences that shape medical students' early sensory perceptions are often far removed from patients' and physicians' embodied realities.

Institutional means also reflect the ways in which physical dispositions shape experiences. For instance, students tend to emulate the body presentations and positions of their tutors as part of their learning, a phenomenon described as 'prestigious imitation'.<sup>40</sup> One example of this is the 'listening gaze',<sup>1, 49</sup> where doctors listening to patients' heart sounds avoid eye contact and close their eyes or stare into space. By imitating the stance of their preceptors, students don the habitus<sup>41</sup> of their future profession.

The institutional means of BP are reflected in the situational structures and conditions that teach students 'ways of knowing' that draw on and hone the use of multiple sensoria. However, institutional means can also lead learners to develop sensibilities that are irrelevant to patient care and may even be harmful; for example, by focusing on listening to a patient's heart, learners may neglect to listen to what the patient is saying, or by focusing on using an electronic medical

record during a consultation practitioners have been shown to make less use of nonverbal communication.<sup>50</sup>

The next section moves from pedagogic means to a second major theme of BP – embodied experiences.

### *Embodied experiences*

While institutional means reflect the many contextual factors that shape embodied experiences, the embodied experiences of learners and teachers also need to be considered. Embodied experience refers to how individuals feel about, are physiologically affected by, and orientate themselves within occupational practices. Returning to the lecture theatre example, for a lecturer, the embodied experience is framed by the experience of standing for an extended period of time, and the physical requirements of controlling the presentation technologies they are using. For a learner, the embodied experience is framed by the comfort (or lack thereof) of sitting at a bench for an extended period of time, by the ease or difficulty of seeing and hearing what the lecturer is presenting, and by the noises, smells, and other sensorial distractions of the learners around them.

As another example, we can consider teaching sensory aspects of clinical skills. Harris<sup>25, 27</sup> and Rice<sup>1</sup> draw on Ingold's work on enskillment<sup>44, 45</sup> to highlight the conundrum of teaching a sensory skill, which is tacit and difficult to articulate, using purely cognitive means. According to Ingold,<sup>44, 45</sup> skills are embodied practices born of practical, perceptual activity, learned gradually while becoming attuned to one's socio-material environment. In clinical skills labs and

later on wards, clinical teachers gradually bring sensory learning to learners' attention. Indeed, clinical teachers can employ an array of techniques to make sensory experiences, such as sounds, more available and present to their learners. One strategy is to encourage students to use their own bodies as tools for learning. Harris described this as developing 'resonating bodies' as students tap different parts of their own bodies – lungs, liver, bone – to differentiate between resonance and dullness. Once acquired, this is a sensibility 'that never leaves you'.<sup>25</sup> More recently, Harris and Rethans<sup>29</sup> introduced the term 'expressive instructions'<sup>29, 51</sup> to describe a number of these practices. For example, heart murmurs are 'high-pitched' or 'rumbling' or sketched visually using geometrical shapes (crescendo-decrescendo); see Table 1. Mimicry is also an important technique; for instance, preceptors move their arms like orchestral conductors to illustrate the crescendo and decrescendo of heart murmurs.<sup>25, 27-29</sup> For analogies and metaphors to be educationally useful<sup>52</sup> they must be rooted in students' experiences and therefore may be culturally specific.<sup>49</sup> For example, to suggest that a pleural rub is like the 'squeaking leather' of trams (as one of the authors was taught) means little or nothing to contemporary learners, while coarse crackles in the lungs can be more meaningfully described as sounding like Velcro. Indeed, a variety of techniques such as simile, metaphor, graphics, demonstration, and mimicry may be used to 'connect the technical craft to the imagination'<sup>51</sup> so that the objects, events, and relationships to which they refer can be imagined at least (see Table 1).<sup>25, 26, 28, 29</sup> Students come to know lung and heart sounds by means of repeated, embodied, perceptual practice.

As students move to clinical settings, they learn to 'tune out' sounds of the clinical environment, such as alarms and monitors, equipment and people moving, and the buzz of conversation, and 'tune in' to the sounds of the body. An interesting example of this is given by Collins et al, in a study with nursing students, where students were trained to pay more attention to noises in the

ambient environment through a series of music workshops.<sup>53</sup> When starting to learn body sounds, most students hear little initially; they feel awkward as they try to position their stethoscopes and frustrated because they do not know what they should hear.<sup>25,26</sup> With guidance and practice, they develop the skill of ‘agile listening’,<sup>54</sup> fine-tuning their ears to the multiple layers of meaning embedded in heart or lung sounds. Over time, learners develop into ‘virtuoso listeners’<sup>55</sup> who are able to communicate their embodied experiences of sound using the formal language of medicine.<sup>49,55</sup> Sharing and creating sounds and experiences within a peer group<sup>26,28</sup> can engender a sense of community and shared practice. At its best, embodied experience can help students integrate into a community of practice, while failure to socialize to the sensory task within a peer community can socially isolate students or even result in failure.

While students are typically taught physical examination as a set of separate sensory skills – inspection (sight), percussion (hearing), palpation (touch), and auscultation (hearing) – in practice, clinicians need to integrate these senses and the knowledge they yield. Detecting disease by means of percussion, for example, involves both touch and sound.<sup>25</sup> Percussing the chest, an astute clinician might see that the two sides move asymmetrically and smell the fetor of disease on the patient’s breath. Physicians often engage the whole ‘sensescape’<sup>56</sup> of the human body; they look, listen, feel, and occasionally sniff.

Other examples of embodied experience in health professions education include studies on learning intimate physical examination,<sup>57</sup> visual interpretation skills,<sup>58</sup> surgery<sup>59-61</sup> and clinical reasoning in physiotherapy.<sup>62</sup> Bourdieu’s concept of habitus, which focuses on how medical culture is embodied, is commonly used.<sup>41</sup> Others have noted the significance of physical doing through action, described as ‘dialogism in action’<sup>63</sup> or ‘intercorporeal action’.<sup>60</sup> Kneebone *et al.* draw on Hindmarsh and Pilnick’s<sup>64</sup> work to adopt the concept of ‘intercorporeal knowing’, that

is, ‘the practical knowledge of the dynamic bodies of others’ and call for greater attention to other sensory modalities, in particular haptic cues and kinetics.<sup>59</sup> In physiotherapy, researchers are increasingly attentive to phenomenological theories of embodiment to examine the lived bodily engagement between therapist and patient.<sup>65, 66</sup> Finally, there is much to suggest that, for example, medical education often spends more time promoting a sense of disembodiment than embodiment.<sup>6</sup> Leder, a physician-philosopher, described the ‘dys-appearing body’,<sup>67</sup> where the body fades into a perceptual background only to ‘speak up’ in a moment of disruption, as in illness. Learners who are encouraged to work without sleep and food also learn to deny their physical responses and the physical and emotional consequences of doing so.<sup>6,68</sup> Learners’ bodies ‘dys-appear’ only to ‘speak up’ in moments of exhaustion or distress.

### *Embodied outcomes*

Embodied outcomes are changes in bodily capabilities that occur as a consequence of learning. Examples from other professions include army cadets developing new ways of breathing<sup>35</sup> and ballet dancers performing arabesques even when injured.<sup>36</sup> In medicine, repeated practice establishes body sounds (such as heart and lung sounds) as part of students’ perceptual repertoire. These sensory judgments become unconscious and intuitive, or habits of practice. The term ‘habits’, originating from Merleau-Ponty’s work on perception,<sup>17</sup> is an important concept in BP.<sup>31</sup> Habits enable people to ‘economize and simplify their actions, by storing fruits of past experiences so action can occur without having to devote heightened consciousness to every element.’<sup>69</sup> Repeated practice of physical examination skills reorganizes physicians’ body schemas<sup>17</sup>, integrating previous and present experiences and learnings that become re-established

as a stable perceptual background. Skills become embodied so participants no longer need to think about them. Encountering something unexpected, however, interrupts fluent, habitual performance. Harris demonstrates this by recounting her personal experience with unfamiliar equipment in a foreign setting to insert a cannula. She uses Merleau-Ponty's idea of the 'body-in-the moment' to interpret her experience.<sup>17</sup> Typically a familiar task, she struggles to access the vein. Her body, usually operating tacitly in the background, came to the fore manifested as sweaty palms and a sense of unease.

There are close parallels between these insights from embodiment theory and the model of skill acquisition developed by Dreyfus and Dreyfus<sup>70,71, 72</sup> and Kahneman's dual processing model of learning.<sup>73</sup> Both models recognize the importance of intuitive competence, embodied experience, and contextual responsiveness.<sup>73</sup> Skills change from propositional and intellectual to being bodily appropriated, or lived.<sup>74</sup> Becoming an expert involves developing bodily expertise as well as cognitive capacity; physicians' bodies, not just their minds, are honed and crafted in order to enact their expertise.<sup>25</sup>

[TABLE 2, FIGURE 1]

## **Implications**

Our central argument is that learning is not solely a cognitive process. The body is sensate, a site of knowledge production and corporeal wisdom, which is a critical yet often disregarded aspect of health professions education. To that end, we have explored BP in the context of health professions education as a way of examining learning as something that connects mind, body,

and environment. In introducing and orienting BP in the context of health professions education we have perforce only considered some of the ways in which it might be applied in our field. A more deliberate and substantive exploration of BP in health professions education is therefore needed, both to better understand current practices and to generate new approaches to embodiment in health professions education.

Theories of embodiment have great potential in opening our field to more deliberate and theoretically grounded practice and scholarship. Not only does BP provide a set of organizing principles, it can also help to problematize and make strange the habitual and tacit use of embodied experiences and embodied competencies in medical education. By foregrounding these habits, they can be questioned to become the focus of study, reflection and development. A BP perspective allows us to consider models of teaching and learning that operate directly on our bodies<sup>75</sup> and how individual-environmental connections shape the self and the intercorporeal body work of medical education. In doing so, health professions education could contribute to a growing body of literature on the intersections between mind-body-culture.<sup>47</sup>

Having established or recovered a deliberate sense of embodiment in medical education, we may also ask ‘what then?’ Although not articulated in body pedagogics *per se*, reflection on one’s embodied experiences is a logical next step.<sup>76</sup> For instance, Dewey<sup>46</sup> observed that reflection and thought are grounded in embodied experience, situated within, and intentionally orientated toward, our environments; our senses are ‘*a means of connection with what lies beyond [our] bodily frame.*’ We could therefore expand reflective learning to consider more explicitly the physical experiences of learning medicine. Learners could, for example, be guided to attend more consciously and reflect on the institutional means of how the physical context of learning, literally, shapes them, to pay more attention to their embodied experiences and to consider how

their bodies are changed (both positively and negatively) by their learning. Simple techniques, such as those used in mindfulness training<sup>77</sup>, that draw attention to physical sensations of the moment may offer potential in this regard. For example, a common strategy in mindfulness training is to ask participants to pay attention to their physical body (listing things they see, hear, feel) within a given environment. More advanced learners could be invited to engage in ‘embodied reflexivity’<sup>78</sup> in which they attend to their physical responses and experiences while conducting procedures or patient consultations. Making tacit and arbitrary embodied experience explicit and deliberate could increase professionals’ awareness of their physical needs thereby fostering resilience and protecting against burnout. By engaging medical learners’ bodies as well as their minds we can treat them as whole beings.<sup>20</sup>.

BP also has connections with sociomateriality in that embodied experience affords theoretically rich ways to connect physicians with the technical tools of their practice. O’Conner observed that ‘to feel through tools is to extend ourselves into and embody those tools’.<sup>79</sup> Senior physicians’ use of the stethoscope has been examined similarly,<sup>26</sup> but other everyday tools of clinical practice have not been explored from this perspective. Gynecologists’ use of specula, surgeons’ use of laparoscopes, and intensivists’ use of monitors could benefit from such investigation. A clearer focus on and understanding of physicians’ embodied use of tools could help move educators and practitioners toward a more mindful and deliberate approach to practice. As Polyani suggested:<sup>80</sup> *‘We use instruments as an extension of our hands and they may serve also as an extension of our sense. We assimilate them into our body by pouring ourselves into them’.*

A second example involving technology is telemedicine, where patients and health professionals interact in somewhat disembodied ways. It has been suggested that some forms of sensory engagement (e.g. touch) may become less important in this context than they are in face-to-face



practice whilst others may be brought to the fore (vision).<sup>81</sup> Research into the BP of practice and education has been predominantly absent in telemedicine to date.<sup>81</sup>

BP is not without its limitations; just as the opportunity to draw from diverse disciplinary backgrounds entices, it opens opportunities for conflicting viewpoints and risks theoretical dilution. For example, BP draws on Foucauldian notions of power as physically impressed on the passive body,<sup>42</sup> while sitting equally comfortable with phenomenological notions of the body-subject.<sup>17</sup> Yet Foucault was critical of phenomenological theory<sup>82</sup> and this co-positioning of his work may not sit well with some scholars. Such diversity is common within the field of embodiment, to the extent that the body, which appears to be solid, becomes increasingly elusive and ever distant.<sup>83</sup> Another issue is the extent to which an embodied sense of medical tools and of patients can improve medical practice. While research on topics such as mindfulness indicate its value in reducing stress and burnout<sup>77</sup>, further research is needed to explore what kinds and levels of deliberate embodied learning and practice afford improved patient outcomes.

BP opens new avenues and theoretical possibilities beyond habitus to examine embodied learning. Phenomenology, by drawing attention to lived experience, places a particular emphasis on embodied experience, and authors such as Merleau-Ponty,<sup>17</sup> Leder,<sup>84</sup> and Kearney<sup>85</sup> offer insightful philosophical perspectives that could inform BP in medicine. Additionally, a more formal recognition of the inter-relatedness of mind, body, and environment in learning could create new opportunities for education researchers to engage with the growing number of investigations into embodied cognition.<sup>86, 87</sup> Embodied cognition considers behaviour as emerging from real-time interactions between brain, body, and environment. The brain is part of a broader system that involves perception and action critically, as well. Similarly, feminist embodiment theory,<sup>88</sup> has been little examined in medical education. We know little about

embodied experience as gendered in medicine; for example, is the experience of learning physical examination or performing surgery different for men and women? Indeed, how do factors such as physical strength and body size alter the experience of learning and practicing medicine?<sup>89</sup> BP also focuses our attention on the breadth of our sensory engagement with the world and makes a case for the legitimization of all sensory knowledge. Newer technologies, for example PET scanning, are currently being applied to pedagogical research. These approaches, combined with visual tracking and haptic feedback, could inform how we select between the senses and how we prioritize different decisions and synthesize information.

## **Conclusion**

In summary, BP can help to foreground and connect opportunities and drivers for embodied learning, the experiential nature of embodied learning, and the consequences of embodied learning on practice. Although these phenomena have long been a part of practice and are reflected in the literature, they remain peripheral to the major discourses in medical education. This reflects the paradox that, as the body learns and is disciplined to habitual practice, the role of the physician body, and thereby the role of embodiment in medical education becomes invisible. BP can help us to reassert the central role of embodiment in medical education and make strange the habits and disregarded aspects of embodiment so they can be seen both as instructional strategies and the subjects of research and evaluation.

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## Tables and Figures

Element of BP	Technique	Example	Details	
Institutional means	Spaces	Rooms, buildings	Clinical skills laboratories; hospital wards; operating theatres	
		Equipment, facilities	Plastic organs; simulators	
	Body dispositions	Stance	Listening gaze; positioning of body relative to others	
		Clothing	White coat; scrubs; stethoscopes	
Embodied experience	Language <sup>28</sup>	Metaphor	Pulling apart Velcro to suggest sounds of crackles	
		Simile	Comparing crackles to a sail filling in the wind or a paper bag blown up to capacity	
		Mimicry	Teacher mimicking sound, e.g. ‘whoosh’ of placental blood flow when trying to hear fetal heart beat	
	Graphic representations <sup>28</sup>	Heart and lung sounds described by their shapes		<p>Crescendo – decrescendo murmur of aortic stenosis</p> <p>Pre-systolic murmur, e.g. mitral/tricuspid stenosis</p> <p>Stoney dull pleural effusion</p>
			Use of the body	Demonstrating with the physician’s body <sup>29</sup>

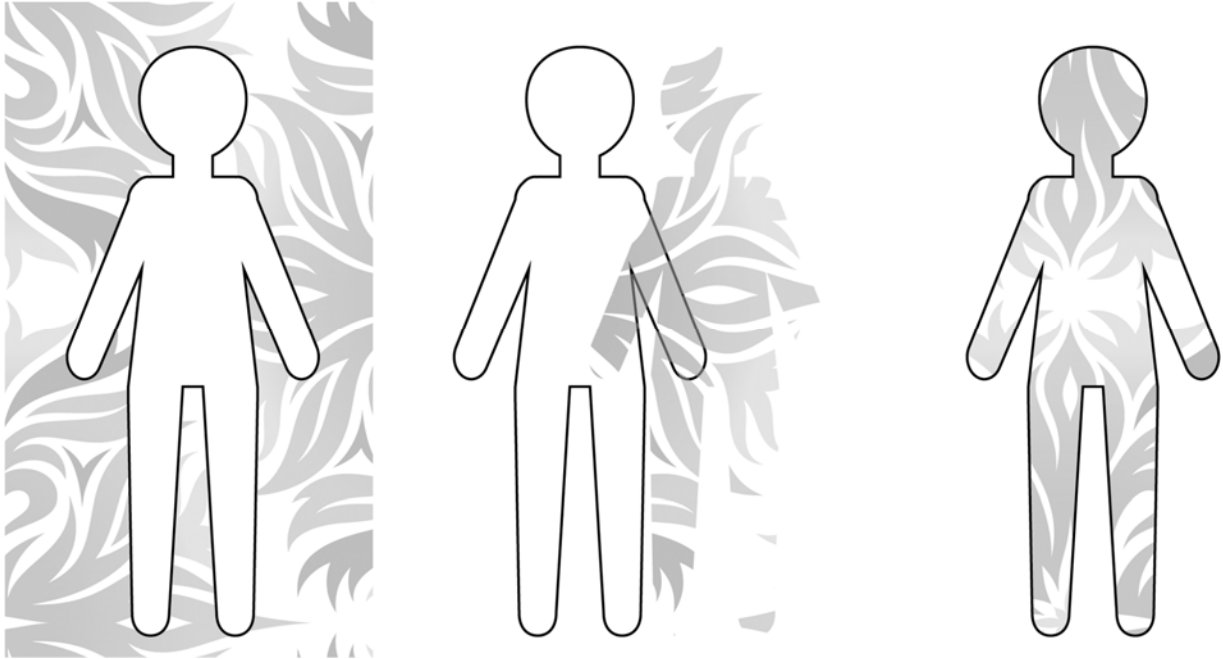
		Demonstrating with the student's own body	 <p>Feeling oral tissues to mimic texture felt on vaginal examination<sup>90</sup></p> <p>Listening with stethoscope over trachea to simulate bronchial breathing</p> <p>Practicing percussion on student's own body<sup>25</sup></p>
	Use of materials to hand <sup>29</sup>	Using everyday objects to simulate physical examination findings	<p>Tennis balls mimicking fibroids</p> <p>Half-full hot water bottle simulating full bladder</p> <p>Orange illustrating peau d'orange (skin abnormality of breast indicating malignancy)</p>
Embodied outcomes	Habits of practice	Routine practice	<p>Recognizing facial expression of an individual typical of a particular disease or condition (Down's syndrome, Parkinson's disease)</p> <p>Tying surgical knots; performing venepuncture</p>
		Exceptions	<p>Having a gut feeling that 'something is wrong' during routine encounter</p> <p>Acting without apparent thought, e.g. a surgeon 'slowing down' in response to unexpected findings or events</p>

*Table 1: Techniques and examples of body pedagogics in medical education*



<b>Factor</b>	<b>Cognitive</b>	<b>Embodied</b>
Knowledge	Being able to describe the signs that a child is sick (fever, increased pulse rate, rapid breathing, sunken eyes, dehydration)	Recognizing that a child is sick within moments of entering the room (characteristic smell on the breath and pale skin color)
Skills	Being able to implement algorithms, clinical guidelines, and checklists; demonstrating system 2 problem solving <sup>73</sup>	Performing routine tasks automatically; being dexterous; performing fluently; demonstrating system 1 problem solving <sup>73</sup>
Attitudes	Responding to a patient's distress with understanding language	Reaching out to offer comfort; having an open body posture, and 'speaking' with body language; patting the shoulder or holding the hand of a palliative care patient

*Table 2: Knowledge, skills, and attitudes as cognitive and embodied*



*Figure 1: Three dimensions of body pedagogics; 1) institutional means – exposure to embodied experiences and opportunities to engage in embodied learning; 2) embodied experiences – the ways in which embodied learners develop embodied capabilities and practices; 3) embodied outcomes – the ability to use or draw on embodied capabilities and practices.*