This chapter argues for the place and value of mess and complexity in digital education, in particular with regard to emerging technologies. Such an argument is both necessary and relevant at the present moment, when so many of the visions of education being put forward gravitate toward extreme utopian or dystopian positions. As Hand (2008, p. 15–16) describes it best, “digital technologies are now the engines of promise and threat in a global information culture” seen as either “indicative of a break with particular modernities, in terms of socioeconomic structures and/or cultural objects and practices” or “augmenting the continuously dominant structures of capitalism.” Digital education is not sheltered from these tensions, and it is frequently looked at as either the cause of or a solution to multiple “problems” in education. Utopian and dystopian narratives of technology are widespread in discussions of online education, often manifested in a technologically determinist position, and in a rhetoric that invokes the “technological imperative”: “because a particular technology means that we can do something (it is technically possible) then this action either ought to (as a moral imperative), must (as an operational requirement) or inevitably will (in time) be taken” (Chandler, 2002).
Recent headlines about the Massive Open Online Course (MOOC) phenomenon are indicative of how some perceive opportunities while others fear the influence of new educational delivery modes. As exampled in these excerpts from a variety of recently published articles, some journalists have asked if MOOCs will:

- revolutionize corporate learning and development (Meister, 2013);
- create divisions in society (Montague, 2014);
- kill university degrees (Stokey, 2013);
- de-professionalize higher education (Carter, 2014);
- help democratize higher education (MacGregor, 2013); and
- massively disrupt higher education (Booker, 2013).

Where utopian dreams of technology meet commercial interests, educators and researchers see commonalities in the nature of these fantasies. Advertising for educational technology is saturated with promises of speed, simplicity, and efficiency. Educational technology and software companies have evidently found that these promises will sell their products to institutions and teachers: this is what educators indicate they want and need. For example, the following claims, presented anonymously here to avoid critiquing any particular platform or service, are indicative of how such products are marketed:

“The design of our platform is based on sound pedagogical foundations that aim to help students learn the material quickly and effectively.”

“The student knowledge profile clearly and quickly shows students (and their teachers) where the knowledge gaps are, and how to fill them.”

“Easy drag-and-drop editing marks, voice comments and rubrics make grading faster.”

“Grade any open-response assessment. Fast.”

“Offload content delivery to jump-start the learning process.”

The desire for these types of products is shaped and spread by what Gough (2012) refers to as the “politics of complexity reduction” (p. 47) in education and educational research. Gough’s criticisms of such politics echo earlier calls
from scholars focusing on complexity and supercomplexity in higher education, which requires “a view of learning construed as, at least in part, the acquisition of those human capabilities appropriate for adaptation to conditions of radical and enduring uncertainty, unpredictability, challengeability and contestability” (Barnett & Hallam, 1999, p.142). McArthur (2012) claims that complexity reduction has led to “bad” rather than “virtuous” mess: “Seeking to force the inherently messy into a respectable tidy form can result in something that distorts, hides or falsifies the actual social world” (p. 421).

Educators, students, researchers and instructional designers who value critical perspectives on digital education and emerging technologies often are caught in an unproductive cycle of critiquing overly optimistic and overly pessimistic narratives. One way to break out of these unhelpful extremes is to attend to the complexity and messiness of education itself. Focusing on teaching, we argue that emerging digital practices that contribute to the fruitful mess that characterizes education cast a new light on issues of power, responsibility, sustainability, reach, and contact. We discuss approaches that may help us steer away from indulging in overly simplistic utopian or dystopian explanations that unhelpfully limit “possible fields of thought and action” (Hand, 2008, p.40).

Those of us interested in emerging technologies and emerging practices would do well to resist constraints on thought and action wherever possible, because a key element of emerging technologies and emerging practices is their not-yet-ness. In chapter 1 Veletsianos argues that there is much educators and researches are not aware of while engaging with emerging technologies and practices. We must therefore choose to dwell as teachers in the state of radical and enduring uncertainty that Barnett and Hallam (1999) describe. We need practices that acknowledge and work with complexity to help us stay open to what may be genuinely surprising about online learning and teaching intersecting with emerging technologies. In this sense, our focus as educators should be on emergent situations, where complexity gives rise to “new properties and behaviours . . . that are not contained in the essence of the constituent elements, or able to be predicted from a knowledge of initial conditions” (Mason, 2008, p.2).

Online teaching can be theorized to counter utopian and dystopian accounts of digital education. As is claimed in the Manifesto for Teaching Online (Ross, Bayne, Macleod, & O’Shea, 2011), we aim to persuade you that “‘best practice’ is a totalising term blind to context—there are many ways to get it right.” To do so, we explore three key dimensions of emerging technologies, emerging practices, and digital education: design, embodiment, and the wider sociopolitical
context of accountability. In each section we argue for messier forms of thinking and practicing, and suggest possible approaches to work with complexity and not-yetness in productive ways.

TEACHING BORN DIGITAL: DESIGNING FOR NOT-YETNESS

The *Manifesto for Teaching Online* (Ross et al., 2011), a useful touchstone for not-yetness, stated that “the best online courses are born digital.” The “online version”—the object that emerges when someone begins their course design process with the question “Can I put this offline course online?”—is well known to learning technologists and educational developers (Sinclair, 2009). It often involves the use of virtual classroom software, uploaded lecture slides, and other attempts at structures to mimic the campus-based course (sometimes replicating its constraints while missing its advantages). Indeed, most educational digital products and services, such as the virtual learning environment, are based on metaphors and structures drawn directly from the face-to-face classroom (Bayne, 2008; Cousin, 2005).

Often this digital version emerges from a wish to render digital environments unthreatening and to protect instructors, or learners, or the institution (or all three) from having to grapple with the possible difference of the digital. There seems to be a belief that online instruction can offer what the *Manifesto* (Ross et al., 2011) described as “networks and flows” in place of “boundaries” that need policing online. Such policing, however, often silences rather than avoids the disorientation that instructors and learners experience in these digital spaces. In the gaps between the original and the digital version, we might accidentally leave students to fend for themselves, where they could instead benefit from a critical engagement with webness (Ross, 2012a).

How should online instructors take account of not-yetness, and what does it really mean for a course to be born digital? Few educational technologies embrace messiness or not-yetness as a value. For many online instructors, designing courses presents tensions between the complexities of online teaching and learning and the rigidity of the technologies and environments they must use to teach. How might instructors design for complexity in learning in spite of these rigidities?

Asynchronicity; new forms of academic writing that include multimodal and collaborative writing; and also working with speed, brevity and serendipity are a few of the pedagogical possibilities that work best in the online environment. That prominent but under-theorized claim that “the pedagogy must lead the
technology” (Cousin, 2005, p. 117) can be creatively undermined in favour of giving technologies (including those not yet fully understood) their due. We are often shaped by and with the technologies we use, and teaching is no exception. The biggest difference between the “version” and the “born digital” is whether we take technologies of the web into account when we design, or whether they assert themselves in largely unintentional ways.

Some instructors embrace the open web as a vehicle for complexity and emerging practice. Initiatives such as the University of Mary Washington’s Domain of One’s Own (Division of Teaching and Learning Technologies, 2014) encourage faculty to leave behind learning management systems that constrain where, how, and for how long learners participate in learning experiences, and instead “educat[e] students and faculty about the essential building blocks of the web and encourag[e] them to take an active role in the construction of their own digital identity” (Morgen & Rorabaugh, 2014). The use of the open web for learning encourages learners to develop what Stewart (2013) calls the “new literacies of participation,” illuminating a complex view of learning-focused process and dialogue, rather than transmission of information toward the development of specific outcomes.

Cormier (2014a) wrestled with complexity as he designed Rhizomatic Learning: The Community as the Curriculum (Rhizo14), a course offered at the University of Prince Edward Island. The intention of Rhizo14 was to create a community around the topic of rhizomatic learning, which is defined as a form of learning in which the community is the curriculum (Cormier, 2014a). Hence, the community of learning was both the object of study and the process of learning. Cormier (2014b) did not set narrow learning outcomes for the participants; as he expected learners to create their own maps for what and how they would learn. He provided structure to the course by posing challenging questions related to the topics, such as “Cheating as Learning” (Cormier, 2014b). We have foregrounded design here because it is such an important aspect of the instructor’s role in online education. However, a second dimension of teaching with not-yetness is that, having been so thoughtful about course design and choices of environments and how to foreground the digital, instructors have to hold that lightly. The multiple factors involved in any class are bound to produce a certain amount of the unexpected. Adding emerging technologies and emerging practices to the mix inevitably brings the outside in. By definition, what is emerging will not yet be fully understood, and its uses will not yet be set in stone (chapter 1). Often technologies are reflected outside formal education, and that
reflection can be disorienting. Blogging is a key example of this: Wider cultural practices and perspectives create significant tensions and complexity for its use in educational settings (Ross, 2012b). Emerging digital environments open the teacher to experiences which can be unfamiliar and sometimes uncomfortable, and which require new strategies (Macleod & Ross, 2011). Turning to the notion of the “body” of the online teacher, we explore the impacts of complexity on the practice of digital education.

COMPLEXITY AND THE INSTRUCTOR’S (ONLINE) BODY

*My body teaches so much* (Radtke & Skouge, 2012, p. 98).

From early and influential constructivist accounts that privilege “facilitation” in the online domain (Palloff & Pratt, 1999), to the highly authoritative and transmission-based approach of some MOOC designs, the instructor’s role in online learning is contested and varied. The instructor’s body, far from being erased or inconsequential in online contexts, is in fact underdetermined (Poster, 2001). It is made up of many sometimes contradictory practices, including digital environments, course design, learner assumptions and expectations, the teacher’s educational philosophies, habits, and communication styles, and institutional politics, while still being open enough to “solicit social construction and cultural creation” (Poster, 2001, p. 17). It is, in a word, messy. For example, Ross, Sinclair, Knox, Bayne, and Macleod (2014) drew on the literature of academic identity to explore the many ways that teaching can be understood, and argued that the prominent MOOC conceptualisations, of teacher as rock star, automaton, or “co-learner,” are inadequate to the complexity of the role.

The importance of the body of the instructor in face-to-face classroom contexts has been investigated and theorized in a number of ways, notably from critical perspectives that explore issues of power, asking how gender, race, sexual orientation, and disability inscribe the instructor’s body, shape their identity, and influence relationships in the classroom (Erlandson, 2005; Freedman & Holmes, 2003; Kelan, 2010; Latta & Buck, 2008). The instructor’s body has a symbolic and a sensual role in the classroom that goes well beyond the view of the instructor as a transmitter of knowledge (Smith, 2012; McWilliam, 1996). It might seem as though this role disappears in the digital teaching space—and indeed an “incorporeal fallacy” (Land, 2004, p. 532) has permeated notions of cyberspace since its inception, fostering beliefs that the body is left behind
when we go online. However, in both literal and metaphorical ways, digital embodiment transforms rather than erases (Bell, 2002).

Research into online teaching indicates that instructors perceive their cognitive, affective, and managerial roles to be more complex in online environments and often struggle to adjust to those roles (Coppola, Hiltz, & Rotter, 2001; Lin, Dyer, & Guo, 2012). Attention to embodiment plays an important part in understanding and handling this complexity (Bayne, 2005; 2010; Dall’Alba & Barnacle, 2005; Land, 2004; McWilliam & Taylor, 1996). Educational technologies, however, have largely overlooked the embodiment of instructors (and learners), and have claimed that identity can be dissociated from what people do online.

The instructor’s body and presence is deployed in a range of ways in online courses—from singular and stable (as in the lecture-based MOOC) to distributed and mutable (for example, in courses where textual communication is central; Bayne, 2010). Studies of online instructional videos sparked debates on the effects of specific media on learners (Clark & Mayer, 2011; Kozma, 1994), but the complexities of embodiment and physical representation in videos for learning are less understood. For example, eye-tracking and surveys of learners in one study showed that MOOC learners preferred videos that included the instructor’s face, indicating that the face increased the perceived value of the videos; however, videos did not improve learners’ performance on subsequent knowledge tests (Kizilcec, Papadopoulos, & Sritanyaratana, 2014).

Even the singular and stable may be less of either than we imagine. A study by Adams, Yin, Vargas Madriz, and Mullen (2014) on the experiences of MOOC completers suggests that the video lecture can create a “powerful sphere of intimacy” for its recipients, as the video only requires the teacher to perform a personal address (by looking directly at the camera lens, for instance). The extent to which co-presence matters in learning is brought into question by the fact that such intimacy is less about contact (whether mediated or not) than about perception. The MOOC instructor can have a powerful impact on learners even when not really there.

Emerging technologies, which support immersive virtual environments, are another area of complexity. Immersive virtual environments may involve visual, auditory, olfactory, and/or haptic stimulation to create the sensation of an embodied physical experience. Collaborative virtual environments allow multiple users to interact in immersive simulations using avatars, or digital representations (Bailenson, Yee, Blascovich, Beall, Lundblad, & Jin, 2008). Instructors’ avatar bodies create learning effects of which their “controller”
may be unaware. For example, Bailenson et al. (2008) found that student avatars seated centrally to the gaze of a teacher avatar in an immersive learning environment performed better than those seated in the periphery of that perceived gaze. Yet in immersive environments, it is possible to reconfigure the geometry of a space so that all learners are “seated” directly ahead of a teacher’s gaze or to program avatars of teachers to be rendered individually to each learner based on what she wants or needs to see (for example, one student may prefer to learn from a teacher who smiles often; Bailenson et al., 2008).

Sociomaterial perspectives on education (Fenwick & Edwards, 2010) offer theoretical support for the exploration of the online instructor’s body. As the human body becomes increasingly inextricable from the technology that surrounds, monitors, and interacts with it (such as quantified self / biometrics, smart prostheses, and haptic devices), we must consider the ways technology becomes part of the human assemblage, or “complex and dynamic configurations of flesh, others’ bodies, discourses, practices, ideas and material objects” (Lupton, 2013, p.6).

As Watters (2014) notes, “bodies matter when we learn; communities and affinity and situatedness matter; digital learning, even though some of it is ‘virtual,’ does not—or should not—change that.” However, our understanding of embodiment in emerging online learning environments merits additional scrutiny and inquiry. Theories of online embodiment should acknowledge the complex interplay between physical bodies, the digital objects that are constructed or perceived as the instructor’s online body, and the online learners and their physical and digital bodies. In the next section, we highlight a further element in this interplay: the current historical moment of accountability in education, and its impact on teaching with emerging technologies.

MESS IN AN AGE OF ACCOUNTABILITY

As discussed in chapter 1, educational technologies emerge within social, cultural, and ideological frameworks that shape their design and use. A scan of educational technologies arriving to market point to what Denzin and Lincoln (2013) have called a “backlash associated with the evidence-based social movement” (p. 5). An age of evidence and accountability, made salient by global financial crises (Burke, 2003), carries narrow views of how products and services (including education) can demonstrate value to consumers. Denzin and Lincoln (2013) refer specifically to research, but educational institutions are affected
in all areas, and especially teaching, by calls for narrowly defined evidence of learning, or “outcomes-based learning.”

It can be difficult to resist a focus on evidence and accountability in teaching as the terms of the debate invoke the rational and scientific, and often imply disorder and irresponsibility as their inevitable opposite. Accountability and evidence offer simplicity and tidiness, and the notion that instruction can be made better by assembling and deploying content, techniques, and approaches is endorsed by unproblematic evidence. Arguing in favour of accountability, Popham (2009) notes that accountability simplifies teaching since “once teachers have a fix on what their students are supposed to learn, almost all subsequent decision will revolve around how those students ought to learn it” (p. 6). The focus on accountability and evidence condenses instruction to a series of decisions—the determining of what students will learn, think, and do, and the measurement of outcomes thought to be based on the effects of these determinations.

Values of accountability and evidence-based learning are seen in a range of emerging practices associated with online learning. Specifically, digital environments are seen as sites of great promise because of the opportunities they can provide for collecting data about learners as such environments interact with them (chapter 6). Despite increasing concerns over learners’ privacy, many researchers and educators see these data as precipitating a “new data science of learning” (Collier, 2014). This new data science is largely predicated on the evolving computational methods offered by data mining and learning analytics of digital environments. Learning analytics focus on learners’ data trails in digital environments, and researchers leverage the scale and breadth of accessible data to provide power to computational methods. At the same time, online learning environments are increasingly designed and deployed with the production of such data in mind. Analytics are premised on the assumption that what can be tracked in relation to educational activity is also valuable in terms of understanding learning—at least, at scale. Tracking and interpreting digital traces of behaviours in the search for stable and predictable measures of learning is fully compatible with the accountability and evidence-based paradigm. In a sense, learning analytics is the methodology required by the age of accountability.

Problems arise, however, when we behave as if we believe that everything worth knowing about learning and learners can be revealed through these methods via learning analytics (Veletsianos, Collier, & Schneider, 2015) and the “all-representing database” (Law, 2003, p. 7). Biesta (2007) identified problems
for both research and practice which emerge from an unquestioning reliance on evidence: “the focus on ‘what works’ makes it difficult if not impossible to ask the questions of what it should work for and who should have a say in determining the latter” (p. 5). As Campbell (2014) argues, the push toward evidence does not necessarily result in responsible action or marked improvements in learning. It may, instead, reward narrow conceptions of what it means to be a good student and “marching toward compliance and away from more elusive and disruptive concepts like curiosity or wonder.” Then, instruction risks been seen as a matter of implementing routines, with “shared values, discourse, inquiry, and personal growth and labour,” as well as serendipity, play and exploration, de-emphasized in favour of “accountability mechanisms that delimit human interactions to quantifiable behaviours reinforced by external rewards and punishments” (Leahy, 2013, p.10).

Furthermore, data science approaches are shaping and informing research, development, and practice in online teaching and learning, while often failing to acknowledge what is privileged and what cannot be explained through analyses. For example, MOOC-related research has granted great power to large-scale computational analyses of learner behaviours, as evidenced by statements such as the following: “What 6.9 million clicks tell us about how to fix online education” (Conner-Simons, 2014). In terms of future development, these approaches can become self-fulfilling prophecies, closing off some avenues of investigation and research while pouring resources into forms of analysis that promise nothing more (and nothing less) than the tracking and replication of practices deemed successful.

This view, and the research and instructional practices that emerge around it, runs counter to the perspective that teaching and learning are messy activities. Research should attempt to explore, not simplify, these complexities. Working with mess in an age of accountability means acknowledging that learners, too, have complex identities and are embodied in various ways. Learners are connected to families and communities, and located within economic, cultural, and political systems (Morrison, 2008). Ignoring mess limits the extensibility of what is taught in a virtual (or face-to-face) classroom and the usefulness of research conducted in those environments. As McArthur (2012) notes, a lack of complexity or mess signals that important individual and social experiences of learners are being missed, as attempts to define narrow outcomes tidy away lived experience. Measurement alone tells us very little about learning (Morrison, 2008); we need to look at learning in a holistic, contextually sensitive way. This requires pushing
back on outcomes-focused practices in teaching and learning, the technologies that simplify complexities in learning, and research that purports to explain more about learning that it can legitimately claim to explain.

Digital education, and educational research on emerging technologies and practices, should not concern itself only with how well learners perform on tasks and assessments, but also on their ecologies and lifeworlds, and the complexities of how these things interact, because “to atomize phenomena into measurable variables and then to focus only on certain of these is to miss synergies and the significance of the whole” (Morrison, 2008, p. 25). Instructors are well placed to contribute to such research, and to participate in revisiting a range of social science methodologies. Qualitative approaches, in particular, can contribute to a richer picture than that provided by accountability-based analytics alone (Veletsianos, Collier, & Schneider, 2015). Paradigm proliferation, as Patti Lather (2006) describes it, can act as a much-needed corrective to an over-focus on, and currently exaggerated claims for, data science.

CONCLUSION

This chapter offered perspectives on three aspects of emerging technologies and emerging practices in relation to online education. The first proposed that instructors focus on designing for not-yetness, finding ways to engage with the digital on its own terms, rather than attempting to mask it with versions of more established practices that mimic the constraints of the classroom. The second perspective drew attention to the complexity of instructor identity and embodiment, and the fruitful learning which might come from thinking of the body as a relevant site of exploration of the online instructor’s role. The third perspective put the previous two in the context of the “age of accountability” in which digital education is currently operating, and probed what we see as a growing and problematic reliance on emerging technologies and practices with data science and analytics at their core.

In each of these sections we have aimed to persuade you that what we need in the practice, conceptualisation, and investigation of digital education is more rather than less complexity and mess. This claim flies in the face of pressures to simplify, to speed up, to expand, to focus on the measurable and replicable; it pushes back against the demands for efficiency that often accompany institutional interest in online provision. This claim also acknowledges how much we do not yet know about our emerging technologies and practices,
and so invites “responsible experimentation to establish matters of concern” (Edwards, 2010, p. 13).

In calling for paradigm proliferation and diversity in our teaching and research practices, it is evident that

- events and processes are not simply complex in the sense that they are technically difficult to grasp . . . they are also complex because they necessarily exceed our capacity to know them. . . . The world in general defies any attempt at overall orderly accounting. (Law, 2004, p. 6; italics in original)

The correct response to the world’s refusal to be orderly or knowable is not to narrow our vision to see only what we can account for. Nor is it to conclude that education, that unfailingly complex set of ideas, practices, relationships, and materialities, is broken and that “fixing” it (in both senses of the word) is the next great computer science challenge. It is to keep looking for ways to broaden our view. Here we can get help from emerging technologies and emerging practices, which are not only “not yet” but also in a sense “never there”—underdetermined and still open to many understandings and methods. Indeed, learning analytics and the data sciences can and do contribute tremendously to a search for these broader perspectives, when we find ways to uncouple them from prevailing discourses of accountability and limited conceptions of education, and bring them to bear on messier questions.

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