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Mapping academic practice: a Latourian inquiry into a set of lecture slides

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ABSTRACT

How is academic work accomplished within a curriculum that has been established through a digital education infrastructure, and what, exactly, does an academic member of staff do within this digital context? Reflecting on the empirical findings of a three-year ethnography of a distributed medical education curriculum delivered across two university campuses in Canada, this paper demonstrates that the ways in which work that has typically been characterized as academic is enacted within this curriculum, positioned as a socio-technological network, through a heterogeneous network of people and materials. Drawing on the philosophical anthropology of Bruno Latour, *An Inquiry into Modes of Existence*, this paper positions the individual academic member of staff as one amongst many network elements within the digital platform across which academic work is generated and circulated. The paper argues that studies of digitally-mediated higher education can equally rest on small and localized instances of practice as well as on cross-boundary or institutional explorations, and offers ways of thinking that are informed by Latour's philosophical anthropology.

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Introduction

Explorations of technology-enhanced learning (TEL) or teaching with information and communication technologies (ICTs) in higher education often draw the reader's eye through a focus on scale, opening lenses of inquiry into big data (Williamson, 2019), learning analytics (Perrotta, 2021), the massification of higher education (Price & Kirkwood, 2014), or shifts in university teacher professionalism (Unwin, 2007). But what if the viewpoint was reduced in scale, and an inquiry begun from a small, localized point of view? In this article, I argue that a point of entry into the exploration and understanding of technology use in higher education, and specifically the ways in which academic staff are positioned within and by such technologies, can be accomplished through focusing on small and commonplace matters of academic practice. Specifically, I am going to use the mundane example of the delivery of a lecture, accompanied by a set of

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PowerPoint slides situated within a medical education curriculum that, thanks to a complex arrangement of digital technologies, is synchronously delivered across two campuses.

In order to proceed with the inquiry, I am going to take three steps, each of equal importance for the inquiry as a whole. First, I provide an account of the context for the inquiry, reflecting on previously published accounts of an ethnography of distributed medical education. Second, I introduce an empirical as well as theoretical approach: Latour's philosophical anthropology, outlined in *An Inquiry into Modes of Existence* (AIME) with a specific focus on those elements of his framework that pertain to the analysis that I present here (Latour, 2013). Finally, having established the empirical and theoretical foundations of my analysis, I show why something as mundane as a series of PowerPoint slides leads to the tracing of a socio-technical network consisting of multiple human and non-human actors which generates particular kinds of technological being that mediate everyday pedagogical decisions across this medical education curriculum and by extension across other curricula within universities as well, serving in turn to exemplify the changing nature of the work done by academics – lecturers, professors, instructors, and so forth – within the contemporary university.

First step. Context: medical education in a digital age

Medical Education in a Digital Age was the name attached to a three-year ethnography funded by the Social Sciences and Humanities Research Council of Canada (for what follows, see: Cameron et al., 2019; Kits et al., 2019; MacLeod et al., 2015; MacLeod et al., 2017; MacLeod, Cameron, Ajjawi, et al., 2019; MacLeod, Cameron, Kits, et al., 2019; Tummons et al., 2015, 2016, 2018). We used four methods to build our ethnography. The first method was observation: observations ($n = 108$) were conducted in lecture rooms, seminar rooms, staff meeting rooms and technicians' control rooms, and were carried out between January and November 2013. The second method was interview: semi-structured interviews ($n = 31$) were conducted with academic staff, administrative staff, technical/audio-visual staff, and students, and were carried out between July and December 2014 (staff interviews ($n = 16$), lasting between 50 and 60 min), and February and April 2015 (student interviews ($n = 15$), lasting between 26 and 56 min). The third method was document analysis: documents ($n = 60$) relating to curriculum design and implementation, professional accreditation, institutional policy, and technical design and implementation, were analysed between January and December 2013. The fourth method was visual: photographs ($n = 136$) of teaching rooms, administrative offices and audio-visual booths at both campuses were taken between January 2013 and 2014. Data management and analysis was facilitated through the use of qualitative data analysis software (Tummons, 2014).

The broad aims of the project were to explore the implementation of a new medical education curriculum in Canada, distributed across two campuses in different provinces, 400 kilometres apart. This new distributed medical education curriculum, hereafter referred to as DME, was designed to rest on information and communication technologies (ICTs) from the ground up, the application of technology (digital video, digital learning platforms, e-learning devices and such like) functioning as a means to enact

synchronously the DME curriculum across the two campuses. The need to establish comparability of provision in terms of both educational experiences and assessment methods across the two sites, as required by the Liaison Committee on Medical Education for North America (the accrediting body for all such programmes), provided an external driver for the curriculum.

At both sites, Main Campus and Satellite Campus, large lecture theatres, smaller seminar rooms and even student lounges have been equipped with videoconferencing systems. Irrespective of size, all of these teaching spaces are equipped with arrays of monitors that allow not only for the display of media-rich teaching materials (the curriculum is delivered on a largely paperless basis) but also for staff and students at one campus to see and to hear their counterparts at the other, during lectures, seminars, laboratory sessions and panel meetings. State-of-the-art camera and microphone systems within all of the teaching rooms allow for synchronous teaching by one member of academic/clinical staff across both sites, for question-and-answer sessions that students at both sites can take part in, and for the recording of lectures and seminars for future revision and reference. Press-button systems allow students to activate the microphones in front of them (in any teaching room, there is a button and a microphone at every seat) so that their counterparts at the other campus can hear their questions. The cameras in each room focus on them and transmit their image to large screens at both sites so that everyone can see who is asking the question. If lots of students press their buttons to ask a question, a queue is formed that the lecturer can then shuffle through via a screen at the front of the room. Teaching materials are collected and formatted in advance of each lecture or seminar by a specialist team of audio-visual professionals who are more widely responsible for the technological infrastructure – ICTs, cameras, microphones and so forth – that the curriculum rests on. This specialist team work out of control rooms (one at each site) from where they orchestrate the technologies that are in use during lectures, seminars and other meetings, and their work across the two sites is mirrored by the administrative professionals responsible for curriculum meetings, scheduling, and so forth. Main Campus is larger and busier than Satellite Campus. The size of the student cohort at Main Campus (approximately ninety enrolments each year) is nearly three times that at Satellite (approximately thirty enrolments each year). It is at Main Campus that the bulk of in-person teaching takes place, with students at Satellite participating via the videoconferencing system: it is relatively uncommon for teaching to take place at Satellite and be transmitted to Main. Students engage with the DME curriculum for the first two years of their programme of studies before beginning their clerkships.

Some of the findings that emerged over the course of the ethnography have accrued greater salience within the context of the Covid-19 pandemic, such as the concerns of academic/teaching staff relating to their ownership of intellectual property when lectures and lecture materials are recorded in their entirety and made available to students online, and the need to ensure standardization of online materials for access purposes. Other findings provided insights into practices that are more widely found within research into higher education practices but here rendered more acute due to context-specific characteristics, such as students' 'off-task' behaviours, which in this context became predominantly digitally-mediated in part because students at both campuses used ICTs for their individual studies, but also in part because some 'off-task' activities were enacted

across the two sites, and were enabled as well as mediated in part by the same digital technologies that the DME curriculum rested on, in part by the students' own devices. And other findings foregrounded the crucial work done by audio-visual and administrative professionals in establishing and maintaining the curriculum, completing work that was invariably lost sight of but that once brought to the surface was revealed to be as necessary as the work done by academic/clinical staff in accomplishing the curriculum.

However, we also proposed a number of findings that were engendered as a consequence of the particular theoretical and conceptual frameworks through which we conducted our analyses. In drawing broadly on sociomaterial approaches and more specifically on actor-network theory (ANT), we employed the ANT concept of the *principle of symmetry*, which states that there is no *a priori* difference between human and non-human social actors and that both are equally capable of exhibiting agency (Latour, 2005). Consequent to this approach, we articulated the ways in which the practices of the human actors enrolled within the DME curriculum were mediated by non-human actors, specifically the different ICTs but to a lesser extent some of the processes and bureaucratic practices that these entailed. These practices were characterized, variously, by improvisation and workarounds, and were not anticipated by the institutional discourses that framed the DME curriculum. Some of our findings chimed with the conceptual interests of ANT, such as in explicating the ways in which different social actors were enrolled and then mobilized within the DME networks and how they might be prone to breakdown at certain points. Other findings spoke to the technologically-mediated context of the curriculum: for example, one unanticipated technological exposure that we identified was the way in which some people might appear on screen without being aware of the fact. Simply put, the ANT lenses that we used afforded an analysis that treated the technology as *an equal partner* to the different kinds of people involved in the curriculum. Thus, throughout our earlier work, as cited above, we positioned the DME curriculum as a socio-technical assemblage or as an actor-network, the shifts in emphasis between these two approaches representing the overlapping, sometimes differing, theoretical standpoints of the members of the research team as our own ideas developed during our writing.

Virtual learning environments (VLEs) such as Blackboard or Moodle are familiar elements of contemporary higher education. They construct online spaces for learning, but also for the gathering of data from the people who use them – students, academics, administrators. By contrast, the DME rests on a bespoke digital platform. It is an assemblage of digital tools and resources that have been brought together to create the curriculum. The push-button microphone/camera system to allow for synchronous question-and-answer sessions across both Main and Satellite campuses; the audio-visual control booths from which the technicians orchestrate the cameras, microphones and recordings; the PowerPoint slides and other materials that are produced by academic/clinical staff – using a compulsory template – and stored on a server for later access: these and other ICTs make up the DME as a whole. Without this digital architecture, the curriculum would not exist: the videoconferencing and online resources were not *post hoc* additions to an existing programme; rather, the programme was designed from the start as a blended, distributed curriculum. The university designed and built the DME programme in order to meet institutional and sector-wide commitments to extending

provision to higher education 'cold spots' – areas traditionally under-served by higher education institutions.

Thus, this digital infrastructure allows the university to extend from Main to Satellite whilst maintaining institutional uniformity and also – crucially – satisfying the requirements for equivalence and comparability of provision in distance programmes of the Liaison Committee on Medical Education (LCME) for North America. The DME curriculum brings together two cohorts of students who are hundreds of kilometres apart and yet are following the same programme of study, the different staff across the two sites who coordinate this work, the university that has invested in the Satellite campus, and the LCME, without whose accreditation the curriculum cannot function. This complex array of resources, people, materials, all assembled within the DME curriculum, necessarily generates as well as requires considerable organization.

Second step. An inquiry into modes of existence

Our earlier ethnographic writing drew on sociomaterial broadly as well as actor-network theory specifically. In order to extend the analysis here, I now draw on Latour's later work that both expands and enhances the earlier actor-network theory (Harman, 2016; Latour, 2013): *An Inquiry into Modes of Existence* (AIME). AIME constitutes an assemblage of the major themes of Latour's work: science and technology studies, politics, critique, and so forth, arranged as different ways or lenses through which to view the social world, from different ontological standpoints, that Latour calls modes of existence. Some of these are familiar from Latour's earlier work: actor-network theory, technology, law, and politics, are presented as four of these modes. Latour represents all of the modes using a three-letter notation system: actor-network theory becomes [NET], technology becomes [TEC], law is [LAW] and politics becomes [POL]. Other modes represent newer areas for inquiry that are less familiar to many Latourian scholars. The attachment mode [ATT] allows us to explore people's passions and interests; the reference [REF] mode generates a theory of knowledge for Latour's AIME project; the organization [ORG] mode is new to Latour but well-known to theorists within organizational studies (Czarniawska & Hernes, 2005). Latour has identified fifteen modes in total whilst acknowledging that his list is tentative and that empirical research may identify others: in response, a number of writers have proposed additional modes (Conway, 2014; Gilbert, 2020; Maniglier, 2016; Tummons, 2020, 2021; Ward, 2017). For Latour, the modes of existence offer 'a new type of understanding […] especially when we learn to liberate ourselves from some of the supposedly uncrossable borders' that the longer established notions of 'field' or 'domain' put up (Latour, 2013, p. 62). Latour argues for each different mode of existence to be explained according to its own conditions, to be understood on its own terms. In this way, we can explore what makes each mode unique whilst at the same time allowing for the fact that they co-exist alongside and across each other. This co-existence is described by Latour as a *crossing* (2013, p. 56): for example, an actor-network that was characterized by technologies would be designated [TEC-NET], whilst an actor-network concerned to effect political change and discourse would be designated [POL-NET].

For the purposes of the argument that I outline here, I shall draw primarily on three of the modes. First, I continue to draw on actor-network theory, now re-established as

[NET]. The [NET] mode provides the starting point for any AIME inquiry: it is through the tracing of networks of human and non-human actors that we can look for the other modes at work (Conway, 2016; Latour, 2013). In addition to this, I also draw on the technological mode [TEC] and the organizing mode [ORG].

The technological mode of existence, [TEC], allows Latour to refine and expand the ways in which we consider non-human actors within a network [NET]. The principle of symmetry remains, but is enriched because within AIME we can now differentiate between those non-humans that have something of the technological about them as distinct from non-humans that do not. [TEC] foregrounds the ways in which materials of all sorts might be modified, combined or assembled in order to generate tools or technologies that, crucially, can be reassembled, rebooted, even repaired. A ladder can be reassembled: a tree cannot start over again (Kharkhordian, 2016, p. 385). However, it is important to remember that the technological does not reside within the actual object or device that we are investigating but in the ways that it is manipulated or employed, and does not distinguish between a stone tool in a museum, or a brand new laptop computer – both are equally of the technological mode of existence.

The DME curriculum is suffuse with beings of the [TEC] mode. Some of these I have mentioned already: the push-button question-and-answer systems within the lecture rooms, the ICT infrastructure that allows for the sharing and storage of teaching materials, and so forth. Others are beyond the scope of this paper: the high-fidelity medical mannequins that students will use when learning clinical skills within simulation environments; the equipment such as foley catheters that they practice using firstly with mannequins and later with patients when on rotation, and so forth. The varieties and modalities of these [TEC] beings is impressive, but the [TEC] mode can nonetheless accommodate them.

The mode of organizing, [ORG], helps us to make sense of the heterogeneous courses of action that any social actor – non-human or human – is enrolled or framed within. It consists of 'the writing, overwriting, following-through and working out of scripts that "hold" those they signify' (Conway, 2016, p. 53). Within [ORG], the longer-standing sociological notion of patterns of behaviour that are labelled as *scripts* (Schank & Abelson, 1977) is used to describe any and all embedded or routinized behaviours that, crucially, are not merely followed but are also always being actively maintained. Scripts multiply in all sorts of ways, generating *frames* for behaviour and activity that can have greater or lesser stabilizing effects. The extent to which an organizational frame can stabilize behaviour depends on the extent to which the scripts involved have been aggregated like-for-like in order to generate new effects, or whether they have been piled up without worrying about whether they are compatible with each other, thereby generating inconsistencies (Latour, 2013, pp. 398–400). Any form of organizing is inherently fragile, therefore, depending on the stability of the scripting and hence the framing of the courses of action.

In terms of [ORG], therefore, the DME curriculum can be understood through thinking about the ways in which the network [NET] of people and things – especially technologies [TEC] – is accomplished through the instantiation of processes, habits, meetings, conversations and so on that all combine to generate network effects of organizing. It can be seen in the ways in which the audio-visual technicians worked behind the scenes to establish repositories of pedagogic materials that students can access, the

ways in which administrative staff generated new routines in order to bridge the gaps – organizational as well as geographical – between the two campuses where the DME was delivered, and the ways in which the pedagogical practices and habits of academics were shaped by the technological requirements of the curriculum.

With the empirical background and theoretical frameworks established, I now turn to a specific instance, derived from our earlier ethnographic work, in order to exemplify one of the findings of the ethnography that might at first seem to be a small or localized instance but in fact illustrates themes that resonate across the [NET] being explored as a whole.

Third step. PowerPoints and professors

A lecture, delivered over the course of an hour or so in a large lecture hall filled with tiered rows of seats and accompanied by some PowerPoint slides, constitutes one of the most recognizable, not to say mundane, elements of any university-level programme, irrespective of academic discipline. There are several variations on this theme: the slides might have been circulated in advance but might equally be sent out to students only after the class has taken place; the professor might have prepared their materials well in advance and used a network drive to access them – or they might have finished playing around with the slide formatting the day before and brought the PowerPoint file with them saved to a USB memory stick. Some academics will walk into a lecture room for the first time and immediately and confidently set up the ICT equipment, using visualizers or clickers to augment their presentations, whilst others need some rehearsal time or even help from a colleague before presenting a more basic, text-only presentation. Some professors will use images, photographs, and screen grabs from web pages. Others will not. The relative effectiveness of such different lecture-by-PowerPoint models remains uncertain, reflecting the more profound uncertainty that surrounds the effectiveness of technology-enhanced learning in HE more broadly (Goodchild & Speed, 2019). Nonetheless, the presence of this variety in the usage of PowerPoint, as well as other similar ICT tools such as Prezi, is well-established (Hallewell & Lackovic, 2017; Roberts, 2018; Worthington & Levasseur, 2015). It might even be described as a habituated aspect of the repertoire of the higher education lecturer.

Within this DME curriculum, however, the relatively simple, not to say prosaic, professorial practice of writing up a slide deck and delivering a lecture becomes suffuse with both interest and complexity. It is an episode within which is found the use of different digital forms, the requirements of different interests and the organizational scripts generated and/or followed by different social actors. In sum, this single lecture can lead us to consider how the behaviours of all of the different actors, including the technologies [TEC] within this DME curriculum or network [NET] are scripted [ORG].

A *point of entry* is any point within or across a [NET] that affords a starting point for the researcher. When researching networks, any number of such points are available: this is a long-standing element of actor-network theory (Latour, 2005) that is maintained within AIME (Latour, 2013). Here, it is the PowerPoint slide file that is the point of entry for the inquiry. Because the lecture is going to be synchronously delivered across both the Main and the Satellite campuses, recorded and stored online, and because the requirement to establish comparability of provision constitutes an important element

of the DME curriculum from the standpoints of quality assurance as well as comparability, it is important for the slides to be compatible across both sites, and with whatever other devices that any of the students at either site might choose to use to view the materials: standardization becomes paramount. Thus, academic staff are required to submit their slides two weeks in advance, for the audio-visual staff to reformat if necessary prior to the delivery of the lecture:

> There was a lot of little intricacies in the slide development I think, because they do reformat everything to the [Main Campus] wide screen format, which I didn't know about. *And I spent a lot of time going through my slides, making sure everything was positioned correctly, and then they'd reformat it, they'd change the colour scheme, they'd send it back, and everything is stretched out or in different places. And that was, you know, a little stressful.* (Interview, academic staff, emphasis added)

> One of the things I like to say about our system is we didn't really change what an instructor does, typically, on a day coming in to teach, too much. Because typically what an instructor would do is they would prepare their PowerPoint presentation, they'd come in, they'd lecture. […] And for the majority of them, *the only real change was getting the content in early*. (Interview, audio-visual technician, emphasis added)

> So the technology I thought was almost flawless, to be honest. I never had a single hiccup with the technology, except that if somebody shows up with a stick with their lecture on it, being able to upload it. And you know, there was always a kickback, saying, look, *we warned you, you had to be in 2 weeks before*. But I'll tell you what, you can't … it's very hard to mandate it. And if the students suffer because of it then that's not acceptable for me. (Interview, academic staff, emphasis added)

Alongside the ubiquity of the PowerPoint slides [TEC], the actual, physical delivery of a lecture is arguably even more straightforward to recognize, not least due to its greater longevity as a form. Once again, practices and experiences differ. Some academics will stand behind a desk or a lectern, perhaps using a laser pointer to highlight key moments on the texts or images that they are talking to on screen. Others will walk around the room, using gesture as well as tone of voice to elucidate central themes. Some will plan for question-and-answer sessions, writing questions and comments on a board at the front of the room and discussing them in turn, whereas others will not. They might actively seek to engage the quieter members of the student group, or leave them be and allow the more vocal students to take part. Some professors will stay behind at the end to talk with students in a more informal manner, perhaps as they file out of the lecture hall and towards their next classes or appointments. Some will reflect on their lecture and seek feedback – from students or from colleagues. A lecture is at least as varied as the slides that accompany it, and the practice of lecturing has for a long time been explored in terms of voice, paralinguistics, physical movement and embodiment, even what clothes the lecturer chooses to wear (Barkhuizen, 2002; Behr, 1988; Dismore et al., 2019; Tsaousi, 2020).

The infrastructure of the DME curriculum [TEC] again generates organizational effects [ORG] that shape the practices of academic staff in specific ways. Having been required to submit their lecture materials a fortnight prior to the lecture itself, the practice of lecturing is further shaped by the technologically-mediated environment of the lecture room. As previously discussed, the lecture room is constituted in a particular *form* in order to allow for synchronous participation across the two campuses, with

arrays of microphones, cameras and screens that are both run and monitored from a dedicated audio-visual control room. The requirements of the cameras and microphones relaying images of the professor to screens at both sites and of the graphical user interface at the front of the room that the professor uses to manage the flow of questions from students (via the push-button system) as well as the different tools at their disposal (slides, visualizer, and so forth), all combine to fix the professor in place, to require them to stay rooted to a particular spot.

> [The] professor comes in a few minutes later and then right after, the technician comes in to show the professor how to use the equipment. The professor was looking at the little computer screen on the podium and the technician comes in and points to the other bigger screen on the podium. Their attention shifts for a few minutes – *lots of pointing and moving the screens on the desk around*. (Field note from lecture observation, emphasis added)

> They have to be conscious of the camera and the distance site. […] It was pretty much mandatory that, you know, the staff would come in, the lecturer would come in at least a week in advance *to kind of get a tutorial on the room*. And also, there's always a tech[nician] there to greet them at the beginning of the session. (Interview, audio-visual technician, emphasis added)

> The professor left [the] field of vision of camera and went off screen. And then she said 'oh, sorry', and moved back into field of vision of screen. [I am] not sure who told her to move back to her place – or did she notice herself? The fact that she apologized indicates she was told but [I] can't be sure. It shows that the professor is under surveillance. *She has to move only within a limited range [and] has to be on screen at all times*. Constraining? (Field note from lecture observation, emphasis added)

Thus, the new forms of organization [ORG] that are generated by the DME become apparent in the ways in which they mediate human actors. In this instance, users (professors) are made to submit their slides early for compulsory reformatting (a form of evaluation), and later on are made to stand and present their lectures in certain embodied ways that are compatible with the technological requirements of the platform for the purposes of synchronous online delivery. Simply put, the actor-network [NET] of the DME curriculum tells academics how to put their slides together, and where to stand and how to speak when delivering their lectures. And these forms of organization [ORG] also impact on non-human actors – the tools and technologies that are not native to the platform but that are brought into the platform by users: the slide decks that are required to be formatted, circulated and later stored in certain ways, according to particular strictures of the platform – the requirements for uniformity, guarantee of accessibility, and commitment to archiving to allow for subsequent asynchronous access. Following these scripts can be more or less willing or grudging, sometimes requiring external drivers and at other times engendering intrinsic support. But the overall network effect is the same: the accomplishment of the DME curriculum through the digital infrastructure within which it has been built.

Conclusions. So what? Curriculum, ICTs, and modes of existence

With actor-network theory now recalibrated as [NET] and included within AIME alongside fourteen other modes of existence that are all of equal importance (Latour, 2013), the final question that I address here is: what can AIME add to explorations of ICTs in higher education, to explorations of the construction and provision of curricula that rely in

whole or in part on digital technologies? From the perspective of AIME, the DME curriculum is a network of the [TEC-NET] type: a socio-technological network which will always, necessarily, consists of both human and non-human actors, tied together through a series of organizing scripts [ORG] in order to accomplish a number of specific actions – in the case of the empirical example presented here, the accomplishment of the DME curriculum across two campuses.

So how and why should we travel from a single set of PowerPoint slides to a technologically-mediated curriculum delivered across two campuses, using a bespoke ICT-based platform as well as broadcast-standard audio-visual technologies? The 'how' question is straightforward to answer. AIME, like the earlier actor-network theory, is an empirical project, and although the exact methods are never explained in detail by Latour, there is a consensus that ANT demands a focus on the empirical (Elder-Vass, 2015), an 'insistence on painstaking ethnographic research' (Kipnis, 2015, p. 43). This is carried over into AIME, within which Latour frames his discussion as an inquiry being conducted by, variously, 'our ethnographer' or 'our anthropologist', arguably the discipline that Latour most frequently identifies with (Berliner et al., 2013). An inquiry can start at any point in a network – it does not matter which one – and then the careful work of tracing network associations can begin (Latour, 2005). An answer to the 'why' question foregrounds the affordances offered by AIME to the researcher which in turn allow us to not only revisit existing analyses of the take-up, use and effectiveness of ICTs in higher education but also to make sense of these in new ways.

Whilst acknowledging the proliferation of research literature pertaining to ICTs in higher education, it is possible to identify a number of themes that would appear to be revisited on an increasingly recursive basis. Research that reports on successful implementation tends to foreground the roles of early-adopters and technology evangelists whilst research that focuses on institutional-level curricular reform highlights persistent gaps between organizational policy and pedagogic implementation. Other research places the locus of activity squarely on the shoulders of academic staff, distinguishing between older members of staff who are less likely, and younger members of staff who are more likely, to embrace ICTs in teaching. Such arguments generate normative assumptions that are assumed to apply to a highly heterogeneous group of people, focusing on the necessity of changing professional and/or academic identities for ICT use to be 'successful', notwithstanding the lack of clarity within the literature as to what constitutes evidence for successful ICT use and the relative lack of any serious problematisation of the discourses of necessary transformation of HE through technology that are more characterized by ubiquity than by criticality (Englund et al., 2017; Goodchild & Speed, 2019; Price & Kirkwood, 2014; Tummons et al., 2016, 2018). And the persistence over time of this relatively small number of areas for inquiry is noteworthy (Knapper, 1986).

What can an AIME-inflected sensibility offer to the higher education researcher, therefore? Mindful of the necessary partiality of the account offered here, I suggest three lines of inquiry, two concrete and one more speculative. Firstly, there is the particular form of invisibility that [TEC] offers: in removing the sheen of invisibility that any [TEC] being seeks to draw around itself, we can focus any inquiry towards the operating sequences that sustain the [TEC], actively seeking the breakdowns and obstacles that will always characterize the technological, and thereby ensuring that we do not mistake the final output or outcome for the movements or processes that led to that outcome (Latour,

2013, p. 227): our interest here lies in *how* the curriculum does what it does, as much as *what* it does. Secondly, and relatedly, we need to foreground the people who are responsible for establishing and then nurturing the curriculum in terms of [TEC]. As a social *and* technical performance (Hartong, 2016), it is only through the assiduous (and, I would argue, ethnographic/anthropological) tracing of the people as well as processes involved that the political impulses that underpin ICT-based curricula can be fully realized, and we can enrich our accounts of the governmental and political consequences of the expansion of the digital (particularly in this post-Covid period) with considerations of the human actors who help bring these into being and then work to sustain them, who might otherwise fade from view. And thirdly, and more speculatively, we can consider Latour's invitation to consider any aspect of the social world from the point of view of the modes of existence, and think about ways in which the politics [POL], habit [HAB] or even morality [MOR] of digital education networks [NET] might be made sense of, in just the same way as we might unwrap the organizational [ORG] and the technological [TEC]. As ICT-based technological networks and infrastructures proliferate across all sectors of educational provision as well as higher education, surely these need, and also deserve, to be rendered in all of their ontological multiplicities and complexities, so as to avoid repeating the arguments of the past? Instead of yet more evaluation studies of new ICT packages, or more explorations of early adopters versus reluctant adopters which continue to ignore the serious problematisation of the notion of the evidence for effectiveness of ICTs in higher education, we might instead focus on the small details that otherwise get lost sight of as a way of refreshing our perspectives on technologies in higher education teaching and our places, as people, within and alongside these. In an early account of actor-network theory, Latour used the example of a broken-down overhead projector in a university lecture hall to illustrate the symmetry between people and objects but also the necessity of exploring and explaining that same symmetry (Latour, 1994, p. 36). Our overhead projectors have now been replaced by data projectors, visualizers, tablet PCs, automated lecture recording systems, and virtual learning environments. Where does agency lie in the contemporary, technologically-mediated university curriculum and how are we, as people, enrolled within these?

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