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Meeting Ontologies: Actor-Network Theory as Part of a Methodologically Heterogeneous Research Project

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Abstract

How does a researcher investigate phenomena that continually emerge through, with and as various practices? This paper explores this question, drawing on transformative reflections on the unfolding process of an empirical research project investigating professional practice in Dutch early childhood education. The project initially applied an open, exploratory mixed-methods research design, with the aim of gaining a comprehensive understanding of educational realities. As the research project proceeded, however, we found ourselves exploring the multiplicity of educational realities. Incorporating actor-network theory (ANT) into the study design led to an important ontological re-positioning of the project. Drawing on our experiences, we aim to develop the argument that a methodologically heterogeneous research approach is a valuable way to evoke the paradigmatic and methodological reflexivity and humility that is needed to capture the emerging multiplicity of professional practice.

Key words

Actor-network theory; methodological heterogeneity; methodological humility; professional practice; early childhood education

The use of mixed methods research designs is increasingly prevalent in contemporary research practice (Hesse-Biber 2010; Harrison et al. 2020). The theory on mixed-methods design is mainly concerned with how to integrate qualitative and quantitative methods in such a way that the complementary strengths and differences of both techniques contribute to a more comprehensive understanding and a more complete description of the often-complex reality that is under investigation (Creswell 2014; Hesse-Biber 2010; Landrum and Garza 2015; Morse and Chung 2003; Plano Clark 2017).

In a PhD research project investigating professional practice in Dutch early childhood education (ECE), an open, exploratory, mixed-methods research design was applied initially, using both quantitative and qualitative data to explore the overarching research question (Oosterhoff 2021). While starting from a conventional understanding of the quantitative/qualitative division, in the course of the project the first author (who will be referred to in this paper as ‘I’ or ‘me/my’) was inspired by scholars who work with actor-network theory (ANT). And in particular, by how ANT foregrounds the way in which people and things, assemble in networks, co-constitute practice. Once travelling in this sociomaterial landscape, this particular orientation to the world not only offered fresh answers to my research questions, but also affected my way of ‘seeing’ professional practice. I began to realize that the diverse studies in the project were not adding to a more *complete* picture of reality but rather to a more *fragmented* picture, which paradoxically seemed of greater value than striving for completeness. This paper is based on my PhD research experiences and on transformative reflections on the unfolding research process. These transformative reflections evolved within a multidisciplinary research team, composed of myself and my three supervisors with backgrounds in different scientific paradigms (referred to in this paper as ‘we’ or ‘our’).

The aim of the paper is twofold. We aim to discuss the particular value of integrating ANT into a methodologically heterogeneous research design on an empirical project aimed at exploring professional practice in ECE. Our second aim is to draw on the empirical work to argue and help illuminate how a methodologically heterogeneous approach offers a valuable way not to come closer to ‘the real’, but instead, to acknowledge and embrace *methodological humility*. According to Law (2004), such a stance is needed to capture the emerging multiplicity of professional practice. We will also address the importance of such methodological humility for educational policy and practice. The paper contributes to the increasing prevalence of mixed-methods in social science. However, it argues that the focus should shift from mixing *methods* to combining *methodologies* as a way of glimpsing and describing multiple realities and engaging with the tensions inherent in ‘mixed’ approaches.

We will first outline the empirical project. Second, several key ANT concepts will be briefly addressed. Subsequently, we highlight ANT’s contributions to the project as a whole, arguing how drawing on ANT sensibilities led to an important ontological re-positioning of the research project as it unfolded. Finally, we will discuss the relevance and the implications of this repositioning.

Investigating tensions in early childhood education

We begin with an outline of the research study that prompted the research team to argue for methodological heterogeneity. The project started in the wake of tensions in ECE. Early childhood teachers appear to feel increasingly constrained in carrying out their work in a way that is consistent with their own professional beliefs and knowledges. Consequently, their

professional autonomy seems to be thwarted. International research has signalled a growing dissatisfaction in the educational field concerning daily pressures commonly attributed to accountability policies that have been introduced in the name of higher standards. This concern is noted within the broad spectrum of education (Biesta 2009; Gorur 2015; Jarke and Breitner 2019; Kelchtermans 2012; Nussbaum, 2012) and in early childhood education in particular (Bradbury 2019; Frans 2019; Gallant 2009; Goorhuis-Brouwer 2014; Oenema-Mostert 2012; Osgood 2006). For me as a lecturer in teacher training programmes, how to prepare students to deal with these tensions in educational practice became an important issue. To be able to address this issue, I started to wonder what exactly is going on in current ECE practice. This informed the central question of a multi-phase PhD research project: *How does the workplace environment affect the professional autonomy of early childhood teachers?*

At the outset, teacher autonomy was understood in this project as teachers' basic psychological feeling of functioning without pressure (Ryan and Deci 2000) and their experience of being able to carry out their daily work in accordance with their own professional values and beliefs (Oosterhoff et al. 2019). However, to understand *professional* autonomy, I drew on the work of Priestley et al. (2015) to incorporate the notion of agency (Oosterhoff et al. 2020b). Priestley et al. (2015) state that the professional teacher operates within a complex socio-political landscape. To position teachers in this landscape, Priestley et al. (2015) emphasize the role of agency. The notion of teacher agency describes the intentional actions of teachers aimed at transforming and improving their educational practices (Toom et al. 2015). In the research question framing this study, the phrase 'workplace environment' signals the initial intention to explore the current educational landscape in a very broad sense: all possible (f)actors, such as people, things, discourses, policies and working conditions that are either part of the place teachers work (the schools and classrooms) or are around that workplace, including those both near and further away in space and time.

These were the starting conceptualizations. However, these initial notions of professional autonomy, agency and workplace environment were challenged and ultimately changed as part of the unfolding research process. To explain these shifts, we will first provide a brief overview of the project's research design and the main findings. For a detailed description of the full PhD project, see Oosterhoff (2021).

An emergent research design

A defining feature of this project's research design, when considered as a whole, was its evolving character: there was an openness to emergent research questions, to theoretical frameworks and to methodologies. The full research project unfolded along the way and gradually developed into a collection of three distinct but related studies (see Figure 1). Study 1 *Exploring the landscape* created an opportunity to identify research questions of interest that percolated to the surface. Some of these questions were further investigated in two distinct studies, carried out simultaneously: Study 2 *Gauging autonomy* and Study 3 *Speaking with things in ECE*. We briefly outline the research process here.

INSERT Figure 1 around here

The project started with a qualitative study, Study 1 *Exploring the landscape*. Eight experienced ECE teachers were interviewed and the data was analysed thematically. The number of participants enabled me to gather authentic, detailed and extensive accounts of ECE teachers' daily practices, about their drives and frustrations and about tensions and

dealing with them. The data showed that a variety of people and things exerted an influence on the teachers' professional autonomy in complex, interrelated and sometimes contradictory ways. One of the findings was that tensions occurred where managerial practices contradicted teaching practices. New questions arose about *how exactly these tensions came about and what sustained them*. Two subsequent studies were initiated and conducted simultaneously to explore these questions.

A quantitative study, Study 2 *Gauging autonomy*, aimed to generalize and theorize results from the initial qualitative study. Generalizing questions focused on some of the influential factors, such as school management. Specifically, this study examined the role of professional autonomy as an underlying mechanism in the way in which principals influence teachers' job perception in the first two years of Dutch primary education. The study also provided an opportunity to investigate the relationship between the different theoretical concepts of autonomy that I had encountered while preparing for the study. Survey data was analysed with structural equation modelling (SEM) using LISREL 8.80 (Jöreskog and Sörbom 2006) to test a hypothetical model of the assumed relationships.

In Study 3 *Speaking with things in ECE*, I worked with ANT sensibilities to pose different research questions about how people and things together co-constitute everyday Dutch ECE practices. Data from Study 1 highlighted a variety of actors that exert influence on teaching practice. In addition to human actors, such as managers, colleagues and parents, the teachers had also pointed to and described their interactions with a range of nonhuman *things* that influenced their daily practice. Things such as methods, tests, reports, doors and walls. ANT sensibilities (e.g. Latour 2005; Law 2009; Mol 2002, 2010) seemed to resonate with this apparently active role of things that I was seeing. Inspired by ANT, the data invited me to further pull these things out of the background in order to explore questions about their active role in co-constituting everyday teaching practice.

Guided by ANT-inspired posthuman heuristics (Adams and Thompson 2016), I focused on how a specific standard, the Cito standard¹, achieves authority in ECE. I drew on four heuristics – *Studying Breakdowns*, *Gathering Anecdotes*, *Following the Actors* and *Unravelling Translations* – to inform both data gathering and analysis.

The starting point for the ANT analysis was the stories of eight experienced Dutch early childhood teachers from Study 1, which emerged through in-depth, semi-structured one-on-one interviews. All the interview data was materially saturated. However, to focus subsequent data gathering and analysis, we concentrated on one particular research site, Britt (pseudonym) and her school, and conducted additional interviews: specifically, what (Adams and Thompson, 2016) refer to as thing-sensitive object interviews. These object interviews enabled me to attend to the materiality of practices in the classroom and other school spaces.

Interview data and observations began to draw attention to the work of several nonhuman actors. In the spirit of following the actors (Latour, 2005), the object interviews continued with key material actors (e.g., a user manual for the Cito student tracking system, a test booklet for the Cito language test for toddlers, websites such as of the Dutch Inspectorate of Education, and several educational knowledge platforms). These object interviews enabled me to attend to the doings of both the human and non-human actors in the enactment of an

¹ The Cito Institute is the main provider of educational tests and examinations in the Netherlands.

array of teaching and administrative practices. As the ANT analysis proceeded, materially rich data from the other interviews (Study 1) was integrated.

Although all three studies contributed to understanding the central issue under investigation, each study also stands on its own. Each had its own specific research questions, and methods chosen in line with these questions. Each study consequently generated distinct research findings, which - although each valuable - do not necessarily cohere into a consolidated whole. To illustrate this, the next section provides a brief overview of the key findings.

A fragmented picture of ECE

In Study 1, *Exploring the landscape in ECE*, the eight initial in-depth-interviews offered a glimpse of the complex and interrelated ways in which many different actors have a constraining or sustaining effect on their professional autonomy. The methodology used in this study was of particular value in illustrating the impact of these influences on teachers' emotions (Oosterhoff et al. 2020a). The study also enabled me to investigate the teachers' responses to autonomy-limiting influences, showing the impact of specific ECE expertise on teachers' agentic capacities (Oosterhoff et al. 2020b).

The quantitative study (Study 2) enabled me to generalize a specific finding from Study 1, namely the autonomy-enhancing role of the school head. The analysis shows both the importance of teacher autonomy for teaching quality and teacher wellbeing, and the influence of context, with the school head as an important factor in creating that context. The study suggests that the Dutch primary education system offers space for local head teachers to develop a bottom-up approach, with room for teacher ownership. However, the data also indicate that head teachers differ in the extent to which they make use of that space (Oosterhoff et al. 2019).

While the former studies focused on *human* autonomy, and agency as part of that particular construction, the ANT-study (Study 3), in contrast, highlighted the often unnoticed agency of numerous *things* involved in educational practice (Oosterhoff 2021). ANT draws attention to the way in which agency is distributed across networks of people and things. The analysis in this study consciously focused on the active role of standards by describing how a specific Cito standard materialized in extended network assemblages. The standard folded into daily educational practices in the school through test items that were readily translated into proficiency scores, categories and charts, which then became aligned with many other network entities, such as books, worksheets and meetings. In this way, the Cito standard, as an actor-network, more or less subtly appeared to reshape ECE practices.

Study 3 also indicated the existence of diverse versions of standards, which enacted different, partly overlapping, but also contradictory realities. Both managerial and teaching practices enacted multiple versions of the learning child. In the internal supervisor's room², a common assemblage, which depends on statistical methods, enacted the learning child as a diagram: a '*paper kid*'. However, in the classroom, the child was enacted as a *learning body*, an individual performance, witnessed by the teacher in the midst of educational things that belong to the world of ECE. These co-existing realities did not give overlapping answers when pedagogical decisions had to be made: the '*paper kid*' had a problem that had to be solved, the *learning body* did not.

² Every Dutch school has an internal supervisor: member of staff who is exempted from teaching duties to contribute to the educational needs policy of the school.

Thus, the ANT approach opened new ways of inquiry, prompting me to pose new questions and shed important new light on the issues I was studying. The ANT lens enabled me to see how tensions in ECE could be conceived of, and investigated as, *doings* of complex sociomaterial assemblages. However, this particular orientation to the world gradually began to do more than simply offer an additional perspective on the central issue. Working with ANT invited me to reconsider some fixed concepts that were central to the study as a whole: professional autonomy, agency and workplace environment. ANT also urged a rethinking of the methodological choices made in this project, highlighting tensions in the process. Although some of those tensions were very sticky, they ended up being generative and productive in the ways they continually forced us, in the research team, to reckon with ontological and epistemological (in)consistencies. Below, after highlighting some key concepts within a sociomaterial approach, we will elaborate on this impact of Study 3, *Speaking with things in ECE*, on the full project.

The inviting quality of ANT

A sociomaterial approach, such as ANT, foregrounds the entanglement of people and things in the enactment of professional practices. ANT originates from the field of science, technology and society (STS) and has become increasingly popular as an analytical framework in a range of social sciences. Seminal writers such as Callon (1986), Latour (1987) and Law (1987), demonstrate in their early ANT work how science, technology and all other social phenomena in society are effects of the production and reproduction of networks. Recent understandings of ANT, often labelled ‘after actor-network’ (Law 2008), account for ontological multiplicity – the way in which more or less different realities are enacted in different practices. ANT scholars address the consequences of this multiplicity for politics and interventions (Latour 1999; Law 2008; Mol 1999, 2002). We draw mainly on the ‘after ANT’ work in this paper.

Scoping ANT

In this section we provide a brief overview of several ANT concepts that resonated most in this research project and in particular, this paper which focuses on making sense of the ontological junctures and dis-junctures of the mixed-methods PhD research. First, central to ANT is the notion of *symmetry*, the idea that, at the outset, human and nonhuman actors are equally important and capable of changing each other (Latour 2005). Things have agency in the way they exert force, not on their own, but as part of *networks*. ANT draws attention to how things in practice are connected to a multitude of other actors, both human and nonhuman. These networked assemblages of people and things extend in and through time and space. Such a network is also an actor that is able to make other actors do things in particular ways: hence the notion of actor-network. Law (2009) calls this semiotic relationality, ‘a network whose elements define and shape one another’ (145).

Mol (2010) has pointed to the double notion of *doings*. An actor *acts*, it does things, it makes a difference, and at the same time, the actor is made to be, *enacted* by other actors in its surround (Mol 2010). Actors become real – and exist – as part of activities that take place ‘then and there’ (Mol 2002, 33). Consequently, the ontological question of ‘what exists’ is answered in a specific way. Actors, and practices that emerge as an effect of a specific gathering of actors, shape ‘what *is*’. Gatherings of people and things enact *reality*. Moreover, because different things are gathered and used in different places, multiple versions of reality emerge. Mol (1999) illustrates this in the field of healthcare, using anaemia as an example. Because different tools are used in different medical spaces, anaemia is actively enacted in

these different spaces as different versions of the disease. For example, the anaemia diagnosed in the clinic is a set of visible symptoms and complaints articulated by the patient, while the anaemia diagnosed in the laboratory is a low haemoglobin level in an individual's blood. Reality becomes *multiple*.

Consequently, things are not fixed, stable entities, but are emergent and variable (Law and Singleton 2005). Therefore, practices enacted by, and through, these assemblages of unstable dynamic heterogeneous actors, are messy and fluid. Thus, the aim of studying the doings of networks is not to find overall explanations, but rather to unravel their surprising effects in everyday, local practice. The ANT study (Study 3 *Speaking with things in ECE*), describes in detail how educational standards come into being, simultaneously shaping and being shaped, in local, situated practices, through the many connections and dis-connections between tests, categories, test developers, teachers, computers, children, and a myriad of other actors.

Invitations to rethink fixed concepts

As I learned to work with and through ANT, this particular orientation to the world offered fresh answers to particular research questions in the full empirical study of professional autonomy in ECE practice. What became increasingly apparent was the gradual recognition of the specific relevance of ANT assumptions for the study as a whole. ANT unsettles and in so doing, invites the researcher to question the presumed fixed status of concepts. In this study, ANT invited me to reconsider the meaning of professional practice and shifted my understanding of professional autonomy.

First, working with ANT unsettled my perceptions and understanding of professional practices. As mentioned above, the project started with an aim to investigate 'the workplace environment' of the ECE teacher. However, ANT sensibilities raise questions about the possibility of truly knowing what is going on in *the* workplace environment, simply because this environment is too dynamic, fluid and multiple. According to Law (2004), 'events and processes are not simply complex in the sense that they are difficult to grasp. ... Rather they are also complex because they *necessarily exceed our capacity to know them*' (6). For the most part, this is because the world is 'an unformed but generative flux of forces and relations that work to produce particular realities' (7). ANT shows how practice is unceasingly *produced* by a specific gathering of people and things. Practice, as a consequence, is always specific, contradictory and, moreover, in a constant state of flux. Rather than investigating 'the workplace environment', it turned out to be more appropriate to speak of investigating 'professional *practices*' and not to conceive the workplace environment as a fixed and pre-existing concept. Instead, as Reich and Hager (2014) suggest, the workplace environment should be conceived as practices that are constantly being performed and negotiated, entangled with a myriad of other practices.

Second, ANT turned the concepts of professional autonomy and agency upside down. Fenwick (2016) argues that most theory on autonomy is based on a human-centred conception of autonomy and agency that is associated with human intention, initiative and power. The same applies to the literature that informed Studies 1 and 2. In particular, the aspect of agency as part of professional autonomy, captured my attention. At the outset agency was understood as the *intentional actions of teachers*. ANT, however, highlights that agency is distributed, not located in humans nor in things but in gatherings of people and things. As Fenwick, Nerland and Jensen (2012) state, 'the *world* is doing things, full of agency' (3). Humans 'are not considered to be autonomous, sovereign agents' (ibid, 7). Although this networked agency of things is often hidden and black-boxed, in Study 3 *Speaking with things in ECE*, I sought to

take standards out of the background in order to make their assembled and distributed agency visible.

Pausing to reconsider these concepts – how they are enacted, what they do, who-what is implicated, led to a major ontological shift. How did this happen? We consider this shift in the next sections.

Ontological provocations

These ANT ideas about practice, autonomy and agency have significantly affected my worldview in general and consequently led to an ontological repositioning of the research project as a whole. Starting the project by drawing on qualitative methods (Study 1) was based on the paradigmatic assumption that participants themselves could best give an account of their own subjective and complex professional practice. This study was initiated within a constructivist paradigm that considers realities to exist in the form of socially and experientially based mental constructions (Lincoln et al., 2018). Subjective individual constructions are an important source of knowledge-building within this worldview, which strives to ‘generat[e] one or a few constructions on which there is consensus’ (Lincoln et al., 2018, 117). The quantitative study (Study 2) was conducted to generalize some of the findings from Study 1. In Study 2 new questions were asked, stemming from ontological understandings, generally considered to arise from a (post)positivist paradigm. For example, in Study 2, quantitative techniques for data-gathering and analysis were used, with the aim of approximating a singular, ‘real’ reality (Lincoln, et al., 2018, 111). While working with the sociomaterial approach that shaped and became Study 3, I came to realize that the project had been initiated on the basis of scientific paradigms that were based on a particular conception of what it means to execute good science: to approach the world that exists ‘out there’ as closely as possible (Pallesen 2017, 2). In Studies 1 and 2 I had used the technologies and instrumentation that scientists have developed over centuries to capture, measure and describe the - pre-existing or constructed - real as accurately as possible (St..Pierre 2013).

The more-than-human ontology that comes with ANT pushes at and contradicts both of the worldviews that underpinned the first two studies. ANT shows how professional practice is *produced* by a particular gathering of people and things and, as a consequence, is always specific, contradictory and, moreover, in a constant state of flux. ANT, thus, replaces singularity, and indeed plurality, with multiplicity. As Mol (1999) argues, plurality can be recognized either as a specific version of the ‘truth’ that has been constructed through subjective stories, or as mutually exclusive perspectives on a singular reality. Multiplicity, however, means that ‘rather than being seen by a diversity of watching eyes while itself remaining untouched in the centre, reality is manipulated by means of various tools in the course of a diversity of practices’ (Mol 1999, 77). Mol (2002) explains that what something *is* cannot be isolated from the activities that take place in practice. As a final consequence of this conception of practices as emergent, Law (2004) argues that there are no definite realities *out-there*, waiting to be discovered, ‘if only you lead a healthy research life’ (9).

As I worked to make professional autonomy in ECE visible and knowable through different methods and paradigms, it enacted different realities. Through my different research practices, *professional autonomy* became enacted in different ways. In the quantitative study (Study 2), professional autonomy was enacted as something that can be *provided* (or withdrawn) by influential actors in the teachers’ environment (e.g., management). In the qualitative study (Study 1) the agentic aspects of professional autonomy became more apparent and

professional autonomy was enacted as something that can be, albeit partly, *achieved* by the teachers themselves. In the ANT-inspired study (Study 3), agency was also foregrounded but it appeared to be distributed across an array of situated sociomaterial networks. Professional autonomy (or lack thereof), therefore, *emerged* as part of networks of people and things acting to perform specific practices, and it circulated through these networked assemblages. None of these enactments of professional autonomy seemed to be more – or less – real than others; perhaps evoking Mol's (2002) notion of multiple realities.

Responsibility for what emerges

By acknowledging the emerging and multiple nature of reality, the researcher's professional responsibilities light up in new and different ways. St. Pierre (2013) states: 'our responsibility to *being* becomes urgent and constant' (655, emphasis added). From a sociomaterial point of view, Hultin (2019) argues, 'responsibility is the ability to be responsive to the possibilities of becoming in each moment' and the key quality of this responsiveness lies in 'the ability to see, listen, feel, join and participate' in the continual flow of sociomaterial practices and the inherent circulating flow of agency (102). I realized I was not just a researcher drawing on ANT sensibilities. Instead, I was part of the 'method assemblage' (Law 2004, 14). And in so doing, I became a sociomaterial researcher. Thus, becoming a sociomaterial researcher prompts a rethinking of what research *is* and how it should be done in order to investigate phenomena that continually emerge through, with and as various practices. As Thompson and Adams (2020) state, a sociomaterial researcher should consciously attune 'to their own more-than-humanness' (339).

ANT *did* a lot in the full PhD project and not just in Study 3. It assisted in addressing some specific research questions. It also challenged and enriched understandings of professional autonomy and professional practice by introducing new sensitivities attuned to distributed agency in and amongst emerging professional practices. In addition, working with ANT prompted me to rethink some settled ideas about conducting research. Once affected by the particular ontological assumptions of ANT, our research group considered the implications for the full project. Thompson and Adams (2020) state that pausing to consider, analyse and account for how the story of the research enacted difference is especially relevant in post-humanist work. Accounting for the way in which the research 'change[d] one's way of thinking and knowing', acknowledges the 'liveliness' of the research itself (Thompson and Adams 2020, 344). We will account for this process in the next section.

Transformative reflections on the unfolding research process

Popa and Guillermin (2017) argue that combining methodological approaches from different paradigms encourages transformative reflexivity, a form of reflexivity that purposefully engages with difference in order to learn from it. Struggling to make sense of the methodological heterogeneous project the research had become, the research team, composed of researchers with different paradigmatic backgrounds, provided a platform for such a productive reflexive dialogue. This dialogue led to an ontological repositioning of the full research project. Embracing an ontology that perceives reality as emerging, we argue below, advocates for scientific humility. Furthermore, we realized the relevance of this more humble stance when considering the potential impact on educational research, policy and practice.

Diving into an ontological paradigmatic debate

As Adams and Thompson (2016) state: '*thinking* in a new way is closely tied to *doing* (and ultimately *being*) in a new way' (6). Questions arose when simultaneously working with the

different methodological approaches as part of the empirical research project. Did the unfolding project reflect the new ontological assumptions, underpinned by ANT? The first two studies, although grounded in different paradigms, aimed to create accounts of more or less clear causal relationships between actors in a pre-existing or partially co-constructed reality. However, this conception of reality contradicted the sociomaterial sensibilities in Study 3. ANT counters an essentialist ontology in which entities are assumed to have inherent qualities. Instead, ANT posits that ‘entities take their form and acquire their attributes as a result of their relations with other entities’ (Law 1999, 3). Thus, reality emerges and is enacted. And it does so through the liveliness of various practices (Mol, 2002).

Within each of the three studies, I had been faithful to the tenets of the different paradigms used and how each of these is aligned with various rules and customs, data collection and analysis instruments and criteria for conducting rigorous research. At the same time, I was also trying to attend to the underlying, but contradictory, philosophical assumptions. How is it possible to remain sincerely faithful to several ontologies that seem to contradict one another? While paradigms are identified as sets of beliefs (Hesse-Biber 2010), the problem is that such beliefs cannot easily be turned on and off on a whim. Writing about whether or not paradigmatic commensurability is possible, Lincoln et al. (2018) state that *elements* from different paradigms, such as methods, can be combined, but that *stances* are not commensurable. What does this mean? Is faithful adherence to different paradigms in one research project a problem?

It became evident that such questions could not be answered by turning to traditional literature on mixed methods. In explaining this emerging approach to reality, Law’s (2004) work *After Method* helped to make sense of the unfolding methodologically heterogeneous research project.

Becoming humble

In his book, Law (2004) explores how academic methods of inquiry, traditionally aimed at describing stable realities, could find new ways of capturing the fluidity and multiplicity of social reality. Law (2004) argues that this is mostly absent in social sciences. Based on Law’s (2004) work, we argue that the answers to the questions about the limits of faithful adherence to multiple paradigms can be found in the ontological position that underpins sociomaterial approaches such as ANT, which claim that there is no single reality. Multiple realities co-exist. Moreover, realities also emerge *through* diverse research methods and tools. We illustrated this in the previous section, by describing the multiple enactments of professional autonomy in the wake of the different approaches that I worked with when investigating ECE practice.

What happens when a researcher gives up the belief that there is one best way to discover ‘a’ reality? This requires scientific humility. Law (2003) argues that in striving to avoid drowning in complexities, the urge to simplicity is unavoidable. However, the paper that is submitted, the figure that is created, can only be a moment of rest, ‘a moment of concealment. An illusory stasis’ (104). Realizing this, knowing more, but also doubting what we know, becomes a valuable paradox (Lincoln et al. 2018). Such a paradox is especially valuable because the opposite of humility is dominance, which carries the danger of overlooking or denying other realities. And this suggests the need for heterogeneity.

Methodological heterogeneity

Law (2004) states that ‘the problem is not so much the standard research methods themselves, but the normativities that are attached to them in discourses about method’ (4). If realities appear definite and singular, this might be because these realities are being enacted and repeatedly re-enacted in certain hegemonic research practices. Science is *done* in practice, including the production of rules that need to be followed. Thus, Law (2004) argues, it is problematical that advocates of specific research methods ‘tend to make excessively general claims about their status’ (5). Methodological humility implies the understanding that while parts of reality can be captured, for instance, in respondents’ narratives, ethnographic field notes or statistics, none of the different ways of turning realities into scientific knowledge are more *real* than others. Moreover, none of those methods can capture the complexity, fluidity and multiplicity of practice on its own. Law (2004) argues that ‘the need then, is for heterogeneity and variation’ (6). A methodologically heterogeneous approach accomplishes some of this variation.

Foregrounding multiple discourses in a single research project can be utilized ‘to decentre the researcher as the master of truth’ (Lather 1993, 680). Like Hultin (2019), we strive to inspire greater diversity in the epistemological practices of researchers by discussing our methodologically heterogeneous work, ‘acknowledging that there might be multiple – overlapping and sometimes conflicting – interpretations of the world’ (94). How does this position researchers? From a posthuman perspective, Thompson and Adams (2020) suggest that researchers ‘are asked to adopt different ways of knowing *and being*’ (338). This is not easy and sometimes can be a confusing undertaking. However, the relevance of such an undertaking seems to make the investment of this intellectual wrestling worthwhile. Through this reflexive process, the relevance of this more humble scientific stance for understanding professional educational practice became startlingly clear.

The relevance of a humble stance

The collective process of reflexivity resonated with questions that arose as the project unfolded, questions about ‘how knowledge production is shaped by the assumptions and values of participants (scientists, practitioners, policy makers, etc.) and by the broader socio-political context’ (Popa and Guillermin 2017, 21). Over the last decade, the dominance of specific paradigms in the current educational field has been discussed widely. Scholars have noted that increasing attention has been paid in educational research, policy and practice to a particular technical assumption of educational ‘quality’, namely, quality as something neutral, pre-existing, measurable, quantifiable and improvable (Biesta, 2009; Denzin and Lincoln, 2018; Gorur 2015; Hultin 2019; Kelchtermans 2012; Lather 2006; Moss and Dahlberg 2008; Stremmel et al. 2015).

The three studies in this PhD project had similar resonances in their findings: each highlighting in their own way, the presence of a domineering essentialist ontology and subsequent representative accounts of learning progress and educational quality (Oosterhoff 2021). Moreover, specific technical paradigms appear to be reshaping the purposes and practices of ECE (Oosterhoff 2021). Study 3, in particular, showed that the quantifying methods that were applied to measure learning progress and educational quality in ECE (Oosterhoff 2021) seemed, as Law (2004) states, ‘to perform certain kinds of social realities whilst not performing others’ (4).

Nerland (2018) acknowledges the increasing pace of knowledge production in twenty-first century professional practice and the increasing diversity of knowledge-generating actors and stakeholders. Thus, it becomes important to (re)consider the practices through which

particular knowledges are produced and to critically think about the status of the data they produce. The argument for methodologically heterogeneous research projects in this paper might establish grounds on which to call for a more humble and inclusive way of producing knowledge than is currently being done in educational policy, or educational practice itself. In the next section we conclude this paper by suggesting some considerations on how to move in that direction.

Towards a more humble and inclusive way of producing knowledge

By reflecting on the unfolding methodological heterogeneity in this research project, the aim in this paper is to highlight the divergent ways in which knowledge can be produced. Through methodological heterogeneity, this research study became a means for glimpsing and attempting to articulate multiple realities that elide the certainty of a single truth. Law (2008) argues that ‘methods that imagine the world as relatively neat ... [are] epistemologically mistaken, ontologically unrealistic and politically obnoxious’ (642), as this may lead to a belief that the world is simpler than it is (see also Lincoln et al. 2018). Therefore, as Lather (1993) suggests, fostering heterogeneity and refusing closure is a form of validity; in particular, a ‘Lyotardian paralogy/neo-pragmatic validity’ (678), which, Lather argues, is a mode to ‘refine our sensitivity to differences and reinforce our ability to tolerate incommensurability’ (679).

Working with a mix of different paradigms and methods is a way of deliberately attending to diverse practices of knowing and the tension between them. As Lather suggests, an attempt ‘to capture the play of both the dominant and emergent knowledges vying for legitimacy in order to open up a history of what contains thought and how thought is both shaped by and excessive of that containment’ (Lather 2006, 36).

Preparing a stage for meeting ontologies

Based on my experiences, once one sees the world in a sociomaterial way – as emergent, assembling, and multiple – attending to this multiplicity is no longer a choice. If there is no single truth, ‘there will be no single “conventional” paradigm’ (Lincoln et al. 2018, 145). Qualitative research becomes multi-paradigmatic, embracing tensions and contradictions (Denzin and Lincoln 2018). Lincoln et al. (2018) assert that ‘we stand on the threshold of a history marked by multivocality, contested meanings, paradigmatic controversies, and new textual forms’ (145).

While we argue in this paper that we should turn our attention to different practices of knowledge-making, questions of *how* this can be done and *by whom* remain to be explored. This paper illustrates that combining methodological approaches from different paradigms invited transformative reflexivity, in line with Popa and Guillermin’s (2017) work. Within the research team, an effort was made to build ‘a joint normative orientation for [our] research, based on shared theoretical assumptions and value commitments’ (Popa and Guillermin 2017, 21). Furthermore, there was an explicit sense of the relevance of this effort to the issue and context under investigation. We therefore propose there is indeed value for the careful juxtaposition of different *stances*, when one of the outcomes is the evocation of methodological reflexivity and humility.

This paper suggests that when researchers with different paradigms come together, there can be conceptual and practical value when such divergences and tensions are purposefully and playfully worked with in collaborative research projects. As Lincoln et al. (2018) argue, it

might not be likely that controversies will be resolved by such dialogue. However, the idea of the partiality and fluidity of truth might replace assumptions of a single objective reality. The findings of the full study underscore that when it comes to evaluating learning progress and educational quality, the tendency to seek certainty by applying technical thought and methods prevails, perhaps silencing other ways of knowing. Therefore, applied to the educational context, we support the deliberate creation of a stage for *meeting ontologies* by – following Popa and Guillermin (2017) – seeking ways to generate transdisciplinary research teams.

As research continues to be more interdisciplinary, more global, and more responsive to pressing social issues which are complex and entangled in all sorts of spaces, it is very likely that different ontologies will meet more frequently. What we have set out to do in this paper is share one example of how methodological heterogeneity can evoke methodological reflexivity in ways that are generative and productive. Ways that do not sweep antagonisms and tensions under the carpet, but rather bring them out into full view and into dialogue. Moving in this direction requires paradigmatic and methodological humility.

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