



Unsworth, Ruth ORCID logoORCID: <https://orcid.org/0000-0002-4900-3590> (2023) A new mode of control: an actor-network theory account of effects of power and agency in establishing education policy. *Journal of Educational Administration and History*, 56 (1). pp. 54-68.

Downloaded from: <https://ray.yorks.ac.uk/id/eprint/8647/>

The version presented here may differ from the published version or version of record. If you intend to cite from the work you are advised to consult the publisher's version:

<https://www.tandfonline.com/doi/full/10.1080/00220620.2023.2258827>

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form. Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. [Institutional Repositories Policy Statement](#)

# RaY

Research at the University of York St John

For more information please contact RaY at  
[ray@yorks.ac.uk](mailto:ray@yorks.ac.uk)

ISSN: (Print) (Online) Journal homepage: <https://www.tandfonline.com/loi/cjeh20>

---

# A new mode of control: an actor–network theory account of effects of power and agency in establishing education policy

Ruth Unsworth

**To cite this article:** Ruth Unsworth (2024) A new mode of control: an actor–network theory account of effects of power and agency in establishing education policy, *Journal of Educational Administration and History*, 56:1, 54-68, DOI: [10.1080/00220620.2023.2258827](https://doi.org/10.1080/00220620.2023.2258827)

**To link to this article:** <https://doi.org/10.1080/00220620.2023.2258827>



© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 09 Jan 2024.



Submit your article to this journal [↗](#)



Article views: 248



View related articles [↗](#)



View Crossmark data [↗](#)

# A new mode of control: an actor–network theory account of effects of power and agency in establishing education policy

Ruth Unsworth  <sup>a,b</sup>

<sup>a</sup>School of Education, Durham University, Durham, UK; <sup>b</sup>York St John University, York, UK

## ABSTRACT

In this paper, I argue that power promised to England's teachers by the 2010 'Importance of Teaching' white paper has rather played out as a reformulation of methods of policymaking to more indirect modes of government control. I trace the growth of government control in English schools, promised front-line power in 2010 and a rise in non-statutory guidance after this point. Taking an actor–network theory approach to ethnographic data I then describe how a school takes up one such non-statutory educational initiative – 'Maths Mastery'. Focusing on early stages of the school's adoption of the initiative, I trace associations of actors which problematize existing practices for the teaching of maths and how the initiative is imbued with authority in relation to these. I argue that the ways in which certain actors – statutory education policy and government funding – associate with the 'optional' initiative reveals a 'back door' control of teacher agency.

## ARTICLE HISTORY

Received 19 January 2023  
Accepted 8 September 2023

## KEYWORDS

Education policy; actor–network theory; ethnography; education reform; education practices

## Introduction

In this paper, I examine how a policy initiative called 'Maths Mastery' is established in a school as a foundation for maths practices. Through this examination, I argue that government promises of 'power' to front-line educationalists (DfE 2010b) have rather played out as a reformulation of methods of policymaking to a more indirect mode of control.

The work of schools in the English primary school sector has long been entangled with government policymaking. The sector became state-governed in 1870 following the Elementary Education Act (Parliament of the UK 1870) which first established compulsory education in England and Wales for children aged between 5 and 13. As a state-governed profession, teaching can be seen as inherently political, with the work of (state) school teachers and leaders a 'shifting phenomenon' (Whitty 2006, 3), morphing alongside socioeconomic and political activity.

From 1870 to the post-World War II era of 1950s–1960s, a vocational view of teaching dominated England's political discourses. National education policy positioned teaching alongside other caring roles such as nursing (Oancea 2014), with a focus on the moral

**CONTACT** Ruth Unsworth  [r.unsworth@yorks.ac.uk](mailto:r.unsworth@yorks.ac.uk)  School of Education, Language and Psychology, Lord Mayor's Walk, York YO31 7EX

© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group  
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

development of the child (Sokkett 1993). The 1944 Education Act set out a national system of education that was locally administered, with 'a high degree of local decision making ... including the control of the headteacher over the curriculum' (Fisher 2008, 255). Schools worked with local authorities to devise and manage their own expectations of teachers. The role of the school centred around engendering the school's deep commitment to service to the local community (Menter 2009).

By contrast, the latter half of the twentieth century has been discussed in terms of the growth of standardisation agendas in education in England. These agendas have been linked to neo-liberalism (see for example Ball 2003) although the usage of this term is also criticised for false implications of originality and liberalism, concealing 'a culture which was increasingly global in its sameness' (Edgerton 2018, 491). Standardisation was driven through centralised government control of school practices. The 1988 Education Reform Act set out centralised government dictation of school practices – a move taken further over the following decade by New Labour's centralisation of curriculum, assessment and teacher training. Government reasoning for intensified centralised control of school practices is largely rooted in cross-party consensus in the belief of an impoverished state education system (famously reported in James Callaghan's Ruskin College Speech in 1976). Discussing this belief, Fisher highlights how 'a powerful ideological dogma developed rooted in a belief in the superiority of market mechanisms' and 'by the sense that state education was inefficient in terms of international comparisons' (Fisher 2008, 257). Responses to these moves criticised a perceived political effort to standardise and 'professionalise' the role (Hargreaves and Goodson 1996; Hoyle 1982), reconfiguring the content and purposes of education to neo-liberal market aims (Ball 2003).

Gradual seizing of control of the work of schools in England continued under successive UK governments throughout the first decade of the twenty-first century. Government policy continued to dictate curriculum and methods of assessment, with additional direction of pedagogical approaches to be used to teach certain subjects (a National Literacy Strategy, a National Numeracy Strategy, for example). These national policies were reinforced by the introduction of a very public accountability system, through national publication of school inspection reports and pupil performance in standardised tests. Such accountability systems can be seen as part of a growing suite of 'policy technologies' through which government policy took hold of the direction of schools' work (Ball 2003, 215), engendering a discourse of 'performativity' (Edgington 2016). An era described as educational operationalism (Reeves 2007) – of following national mandates – became viewed as one of 'de-professionalization' of teachers through the reduction of professional autonomy (Hargreaves and Goodson 1996).

Against this backdrop a new Conservative-Liberal Democrat coalition government formed in 2010. Their 'Importance of Teaching' white paper promised a substantial return of agency to English schools in relation to the determining of their practices, stating that 'no education system can be better than the quality of its teachers' and promising to 'devolve as much power as possible to the front-line, while retaining high levels of accountability' (DfE 2010a, 3–4). Moves to deliver on this promise included an Academies Act (DfE 2010b) which offered all publicly funded schools in England opportunity to become academies with greatly increased autonomy in curriculum design and school administration for headteachers and academy trust leaders. Further moves included

sanctioning of powers to grant ‘chartered teacher’ status to a profession-led body – The Chartered College of Teaching – who see themselves as offering teachers ‘collective courage achieved from an influential and powerful network’ (Peacock 2017, 1).

Increases in front-line agency are problematic as promised in the ‘Importance of Teaching’ White Paper when juxtaposed with its equal promise of ‘retaining high levels of accountability’ (DfE 2010a, 4). Systems of accountability in the English state school system are often linked to control of schools’ practices through their high-stakes nature, in which accountability itself is not the object of criticism, but rather the systems by which this is centrally enforced (Tomei, Dillon, and Dawson 2014). Following ‘The Importance of Teaching’, the DfE introduced a new statutory national curriculum (DfE 2014), made ‘high stakes’ through association with a subsequent revised statutory national assessment framework (DfE 2016) and continuation of public availability/comparison of school performance data. Such systems may be seen as counteractive to front-line agency with schools locked into government policy definitions of their own success (Moore and Clarke 2016).

Accompanying the retention of high-stakes systems of accountability has been a rise, since 2010, in the DfE’s funding and promotion of non-statutory curriculum guidance to teachers. This often enters schools not as one policy document, but rather as a policy initiative – a ‘movement’ or direction in educational thinking funded by government and promoted through government-funded training bodies, ‘evidence’ reports, subsidised training opportunities for schools. One such policy initiative is that of ‘Maths Mastery’. The idea of ‘mastery’ teaching can be said to have roots based in the work of Bloom (1973), but its usage in relation to the teaching of maths is more recent. The term ‘Maths Mastery’ has come to signify a variety of educational practices for the teaching of mathematics. In this paper, I refer to the term in the sense taken up by the National Centre for Excellence in the Teaching of Mathematics (NCETM), which refers to a particular pedagogical approach, centred around five concepts relating to maths pedagogy: coherence; representation and structure; mathematical thinking; fluency and variation. If primary school teachers hear the word ‘mathematics’ in relation to primary education in England today, they are also likely to hear the word ‘mastery’ denoting this NCETM approach (Boylan 2018). In what follows, I describe how this Maths Mastery policy initiative enters a school. I trace associations of actors in early stages of the decision to adopt the approach as the prime method of teaching maths and how optional pedagogical guidance becomes imbued with the power to control schools’ agency over the shaping of their practices.

## **An ANT perspective of control, power and agency**

In this paper, I examine how the NCETM Maths Mastery policy initiative is established in a school as a foundation for maths practices and argue that this mode of policymaking forms a new, more subversive method of government control of schools’ practices. The data that this paper draws upon is part of a wider ethnographic study of education practices in an English primary school in April–July 2018, whose main research question asked, ‘How is an education policy initiative (Maths Mastery) translated into teachers’ classroom practices?’. This question was addressed using an actor–network theory (ANT) approach to ethnographic data.

ANT was developed in the early 1980s, originating from anthropological and ethnographic work at the Centre de Sociologie de l'Innovation at the École Nationale Supérieure des Mines de Paris. Researchers central to ANT's development such as Bruno Latour, John Law and Michel Callon, drew on post-structuralist ideas to examine and problematize how authoritative knowledge in the sciences is generated (Gorur 2011). Of centrality to the development of ANT is the post-structuralist concern with problematizing the (structuralist) idea that human culture – the social world – may be understood in relation to concrete and pre-established social structures. In contrast to this notion ANT developed as a material-semiotic approach to describing the social world. This means that researchers working within this approach view the world around us as a product of interactions between different social actors, which are simultaneously semiotic (they may carry meaning within social activity) and material (in that social activity is caught up with physical things) (Law 2009). Put simply, the reality we perceive around us is, from a material-semiotic perspective, the result of interactions between people, places, stuff and things, rather than a predetermined, positivistic entity, or solely the result of human activity and interpretation. The ramifications of a material-semiotic approach centre around the idea that if the world is viewed as created by interactions between human and material actors, then we should seek to understand the world by looking for and describing these interactions (Law 1994).

Whilst there are several material-semiotic approaches which share this theoretical starting point, ANT can be defined in relation to its treatment of actors in the production of the social world. One of the key assumptions of ANT is the recognition that both human and material actors hold equal potential to act, in *symmetry* (Latour 2005). A text, for example, may shape meaning-making within a lesson planning conversation just as much as a teacher may. Through the notion *symmetry*, the role of material actors (texts, computer screens, teaching resources, for example), metaphysical actors (ideas, beliefs, and so on) and people (teachers, students, those in leadership roles, for example) are all afforded equal importance in the production of the social world. From an ANT perspective, there are not, on the one hand, material actors and the on the other hand human actors as clearly distinct and separate actants, but rather entanglements of the two. This is due to the idea that actors may *mediate* the work of other actors (Latour 1999), exerting influence on their shape, their activity, or acting in a way in which other actors come to be reliant on them. It is thus that the notion of *symmetry* encourages the researcher to remain open to the idea that the influence of things and people are bound up in each other, reliant on the ways in which they associate and how, studied in unison, they produce our reality (Latour 2005).

ANT provides a lens with which to take an alternate view of notions such as 'power', 'control' and 'agency' within policy-based change in education. ANT's 'flat' ontology removes any distinction between a powerful macro and oppressed micro (Latour 2005). Rather, ANT positions control, power and agency as *network effects* (Law 1994) – an outcome of the ways in which actors associate, as distinct from an a priori quality or essence (Fenwick and Edwards 2012). In terms of notions of control and power, we cannot thus, from an ANT perspective, rightly speak of policy in terms of government power over teachers' classroom practices. Rather, we have a valuable opportunity to describe how certain actors, or *assemblages* of actors (actors which appear to work

in unison through repeated association), are imbued with effects of power or control as policy and existing school practices meet (Mulcahy and Morrison 2017).

Control and power become visible within a network via repeated associations between actors. For instance, we may see how an *assemblage* pertaining to school governance becomes a defining node shaping the actor–network of teacher practices in a school (MacBeath 2008). In a similar vein, Mulcahy and Morrison (2017) describe the Australian government’s innovative learning environment initiative as *assemblages* of actors which perform the initiative differently in different physical spaces. As actors and assemblages of actors circulate within a network, certain orderings establish dominance of some actors over others. An actor–network of teaching practices comes to be dominated by an assemblage of ‘core competencies’ (Ceulemans, Simons, and Struyf 2012) which establish as *obligatory passage points* (OPPs) (Law 1994): actors with which everything in the network must associate at some point. This ordering produces the shape of agency: the ways in which actors may be agentic in the network. Through the notion of *symmetry*, ANT research explores how several agencies are present at any one time; associations between multiple agentic actors produce network activity (Mulcahy and Perillo 2011). In this way, agency is established through the ways in which actors *mediate* the work of other actors (Latour 1999).

One way to trace how control, power and agency are established in a school’s introduction of a new education policy is to draw on the ANTish notion of *translation*. *Translation* in ANT refers to when ‘agents attempt to characterise and pattern the networks of the social’ (Law 1994, 101) and is often used in ANT research to examine moments of change. Callon (1986) sets out the idea of translation through his description of the attempts by three marine biologists to develop a conservation strategy for a declining population of scallops and the fishermen who farm them. He traces the interactions of people and material things which produce successful (or in this case, unsuccessful) development of the strategy as accepted practice:

Four ‘moments’ of translation are discerned in the attempts by these researchers to impose themselves and their definition of the situation on others. (Callon 1986, 196)

Callon’s version of *translation* offers a way of viewing how an imposed alteration (the ideas of the researchers) to pre-existing practices (the actions of the fishermen and scallops) are achieved (or in Callon’s case, are not achieved). In detailing each of the four moments of *translation*, Callon describes the interplay of existing and introduced actors, producing successful, or unsuccessful, use of the conservation strategy. First in the process is *problematization*, in which a need for change to an existing actor–network is established. In the second moment of change – *interessement* – we see the weakening of links between existing actors. At this stage we may also see the simultaneous strengthening of associations to new actors in the network. The third moment of change is *enrolment* whereby more actors are enrolled into the ways of the new practice. Finally, the fourth moment of change is *mobilisation* in which actors act – or do not act – within the new parameters for practice. Within each moment of translation, actors associate, creating either an achievement, or dissolution, of the intended development. In education research, Callon’s four moments of translation have been used to examine the ways in which policy becomes part of teachers’ practices. For example, to reveal how social policy initiatives such as England’s ‘Skills for Life’ become part of educational

practices; how ‘complex policy reform is choreographed through mobilisation of many actants’ (Hamilton 2011, 68).

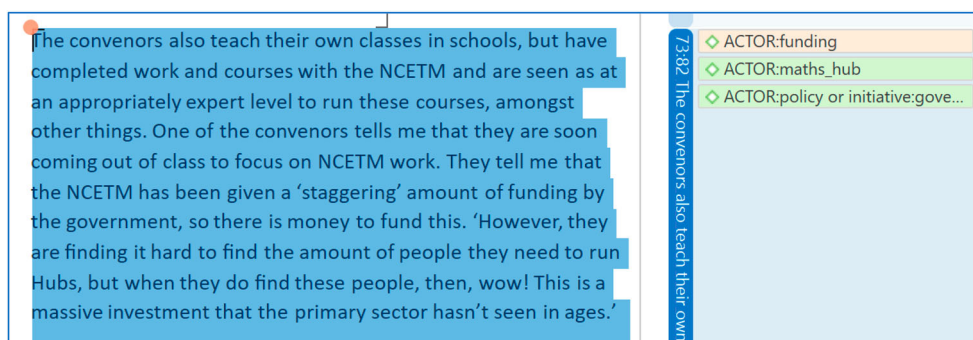
In this paper, I draw upon Callon’s notion of translation to trace the implementation of a government-promoted policy initiative in primary mathematics teaching into a school’s existing practices. I focus specifically on two stages of the translation process – *problematization* and *interessment* to describe how Maths Mastery policy gains opportunity to promulgate in the school. I detail the role of statutory policy and government funding in these stages. It is recognised that this is a foregrounding of two amongst many actors at work in the establishment of educational practices for the teaching of mathematics in the school. An ANT account will always be a partial account (Latour 2005) and the network is a temporary achievement; the actor associations which form within them can expand, dissolve or change (Nespor 1994). Whilst this is the case, it is hoped that this study offers food for thought around control, power and agency in schools’ establishment of non-statutory policy initiatives and in the use of ANT to describe, illuminate and to enable the raising of questions (Gorur 2011).

## Method

The site of the ethnographic study (referred to in this paper as ‘Highland School’) is a state-funded primary school in the north of England, teaching students between 3 and 11 years old. It is part of a large Multi-Academy Trust (MAT) and is highly regarded within the local community. Between April and July 2018 I observed the daily professional lives of 12 teachers and school leaders at Highland School. This included: planning and preparation activities before school; teaching in class; playground duties; staffroom breaks; planning meetings; training events. Although ethics and the scope of the study entailed that I could not join participants for professional activities conducted at home (as most of the teachers reported doing), we discussed these in both informal discussions (noted in fieldnotes) and semi-structured interviews ( $n = 12$ ).

Following ANT’s approach of *symmetry* in relation to human and non-human actors, I needed a way to make non-human actors ‘talk’. This was approached through observations of practices in which fieldnotes detailed material as well as human actors. Field notes were augmented through photographs of non-human actors in usage ( $n = 24$ ). Photographs, along with hard copies of actors such as documents, were also used as aide-memoires during interviews to gain richer insights into the creation and usage of different documents (Pink 2007). In analysing material actors such as the policy texts and funding which are the focus of this paper, an iterative-inductive coding process was used which first used open coding to note actors present in data. In ANT research, noting actors in data often produces a large set of codes initially (Wright 2015), and this was certainly the case in my research. To preserve the flat ontology of ANT, I resisted generalising into abstracted conceptual themes, rather focusing on drawing out links between actors.

For example, Figure 1 shows a screen shot of raw data, coded in Atlas.ti with three codes: ACTOR: funding, ACTOR: maths hub and ACTOR: policy or initiative: government source. Prominence in recurrence of these codes in data formed the basis of wider code groups, for example ‘actors to do with a change to classroom practices for the teaching of mathematics’, or ‘actors to do with government/external to the school actors’. I



**Figure 1.** Raw data and its coding, showing three codes, which are part of two code groups. This is one short example of how data in code groups were linked.

used Atlas.ti's memo and linking functions to digitally link sections and data and to note explanations of the links. Noting links between codes supported tracing the movement and associations of different actors within the network. Following Latour (2005), memos were where writing of the ANT account began: I expanded these into descriptions of patterns of actor associations.

### **Problematization and an assemblage of statutory government policies**

*Problematization* of existing practices for the teaching of maths at Highland School is established through an *assemblage* of statutory government policy texts: a suite of policies which entered the school between 2014 and 2016. In 2014, the UK government introduced a new Primary National Curriculum. The national curriculum is statutory for all UK state schools and sets out the content and skills to be taught at each Primary key stage. The 2014 version saw significant changes around required content and skills. In 2016, the UK government issued schools with a related national assessment framework. The framework continued a statutory nationally standardised system of assessment at the end of each key stage. In the new assessment framework, teachers were asked to assess whether students are 'working at the expected level' for their age group, 'working towards the expected level' or 'working at greater depth' (the highest standard of attainment). Descriptors at all levels echo increases in expectations of curriculum content.

These changes in government policy are represented in policy texts – a National Curriculum document (DfE 2014) and an Assessment Framework (DfE 2016) – which form an intertextual *assemblage* (Law 1994). This *intertextual assemblage* has a particular nature. It consists of documents issued to schools by the UK government, containing statutory government policy. Their statutory nature is enforced via long-established national (government) systems of professional accountability which draw upon outcomes of having enacted these policies. For example, the school inspectorate body, the Office for Standards in Education (OfSTED), use assessment framework outcomes to make judgments about the school. Highland School's last inspection report states that:

The inspectors evaluated the overall effectiveness of the school and investigated ... achievement and standards ... Evidence was gathered from national published data, the school's own assessment and evaluation records ... [Extract from OfSTED Report 2008]

As part of the OfSTED framework, each school in England is also required to publicly publish their student attainment data on their school website: a further way of imbuing the policy assemblage with a sense of authority over other actors. The assemblage establishes as an *obligatory passage point* (Law 1994) with which other actors must associate.

It is through this intertextual *assemblage* of government texts that *problematisation* of school practices for the teaching of mathematics occurs and Maths Mastery policy finds a way to take root. In June 2016, school data tables show that Highland School experienced a 'dip' in students achieving higher levels of attainment in mathematics at the end of Year 2 and Year 6, for the first time in many years:

I'm not saying that everything is results-based, because it isn't, but our rationale for looking at Maths Mastery and greater depth has been looking at actually we need to increase the number of children who are coming through working at greater depth. We saw that there's disparity there and it's going to get greater over time unless we address it. [Wallace, senior leader, interview, June 20th, 2018]

Following identification of the dip in attainment, between June and September 2016, the head teacher, maths subject leader and senior leaders held a series of initial meetings. These discussions centred around the *assemblage* of government texts. Laurie, maths subject leader, explains how they compared the new curriculum and assessment framework to the old.

Laurie moves to his computer and pulls up the 2014 UK National Curriculum. Locating the maths programme of study, he points out the opening description of overall maths skills, highlighting to me a section which reads: "... students should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems" (DfE 2014, 1). In his description, he highlights links between the curriculum and assessment policy texts, pointing to sections of each document and telling me how each part formed the basis of decisions around maths. We noticed that the new descriptor of 'working at greater depth' had more reasoning and problem-solving that was expected of the children that we probably currently didn't focus on as much using the methods we were then teaching with. This reflected changes in the [national] curriculum too. [Laurie, maths subject leader, fieldnote, June 20th, 2018]

The intertextual *assemblage* of government texts *mediates* subject leaders' evaluation of existing classroom practices for the teaching of mathematics. The policy texts provide physical representations of the connected policies which provide Laurie and his colleagues with a frame of reference for their reflective discussions of existing practices. Wallace and Laurie treat these texts in the sense of requirement with which the government has presented them to the school – there is a 'need' to align practices to those specified in the texts. Thus, the statutory policy assemblage mediates leaders' evaluation of existing practices through *interference* (Latour 1999) – the goals of leaders (and subsequently of school development planning, teacher training and teachers' practices) are realigned by the *assemblage*, establishing a need for change – *problematisation* of the existing actor-network of practices.

## ***Interessement, government funding and further textual mediators***

Following the establishment of a need for a change to the ways in which mathematics is taught at Highland School, further network activity introduces and reifies the UK Maths Mastery policy initiative as a basis for this change. This *interessement* – in which associations between actors in the existing network are weakened and associations with new actors entering the network are strengthened – is brought about via associations between myriad actors largely revolving around funding and further textual mediators.

One of the keys actors to bring into association ‘maths’ and ‘mastery’ is the Ark Academy Trust – a multi-academy trust (MAT) of 39 schools in the UK. In response to the UK government’s introduction of a new primary national curriculum, in 2014, Ark starts to write a maths curriculum extending the new national curriculum with pedagogies reported to be popularly used in countries such as Singapore and China. These approaches are widely acclaimed in further actors – online media aimed at teachers. Singapore teachers are, for example, praised as ‘world leaders in teaching maths’ (YPO 2022), with the nation’s students reported as ‘the highest achievers in international maths tests in results from PISA (Program for International Student Assessment)’ (BBC 2016). These online texts carry and laud the Maths Mastery approach.

In this context of acclaim for the Singaporean approach, and in mid-development of their curriculum, the Ark Academy Trust gain funding from the Education Endowment Foundation (EEF), which is partly funded by the UK government’s Department for Education (DfE). Following a period of development, a Maths Mastery curriculum and teacher training programme become distinct from Ark as a separate not-for-profit company: Mathematics Mastery. The company is described on the [arkonline.org](http://arkonline.org) website as:

a non-profit school improvement programme aiming to transform mathematics education in the UK. ([arkonline.org](http://arkonline.org) 2019, accessed June 2022)

The UK government’s Department for Education (DfE), in 2015, adopt Maths Mastery, not as a statutory policy for school, but rather as a policy initiative – a ‘movement’ which is promoted to schools via several different avenues. One of their first moves is to fund a series of teacher exchange programmes between UK teachers and teachers from Singapore and Shanghai in 2015–2016 (Boylan 2018). A further move made by the DfE to promote Maths Mastery was to provide schools with additional funding: £41 million of funding to 8000 schools to support in implementing the change to Maths Mastery. In a press release about this investment in Maths Mastery, the DfE state the intention of this funding as widening of usage of the approach:

The funding will ensure it is used far more widely, with an initial 700 teachers to be trained to support schools in maths mastery, and funding available for textbooks. It will also be used to fund teacher release so teachers can be trained. (DfE press release online, 2016, accessed June 2018)

Simultaneously, the DfE provide additional funding to the National Centre for Excellence in the Teaching of Mathematics (NCETM) to develop their own programmes of training and suites of resources to offer to schools. The NCETM is a government-funded agency set up by the DfE in the wake of the Smith report (DfES 2004) to address recommendations in the report for improvements to mathematics teaching in the UK. The NCETM develop their own version of Maths Mastery methods. They also develop

In Highland School, mathematics subject leaders and teachers they select take up these funded opportunities. Two teachers visit schools in Shanghai on the above government-funded scheme, and Shanghai teachers visit Highland School in return – a visit in which all teachers observe and discuss Maths Mastery-based lessons. Laurie, one of Highland School’s maths subject leaders, attends NCETM specialist maths leader training (a year-long course), a NCETM Maths Hub and Teacher Research Groups (TRGs). Frances, a year group leader, and Joss, a senior leader, attend Maths Hubs and TRGs, whilst Charlie, an interested early career teacher, attends NCETM training days based on Maths Mastery and TRGs.

The audit tool is structured around elements of Maths Mastery that the NCETM has deemed valuable to its initial implementation. The same audit tool is used across all

Teachers have access to high quality resources to support lesson planning (e.g. text books, schemes of work)	Any print resources being used have the aim of developing teacher pedagogical subject knowledge at their heart. They are mathematically coherent, highlight common misconceptions and show clear and appropriate representations.							✓
Any comments on teaching resources:								
Lessons are crafted with care, are discussed with other teachers, and draw on evidence from observations of pupils in class.	Teachers have a clear focus on what children will learn in the lesson, not just what they will do in the lesson. As part of lesson planning, teachers reflect with colleagues on what they have noticed about children's learning in class. They talk to each other about 'key difficulty points' (areas of the topic which children tend to find challenging) and how best to present these ideas.							✓
Lesson designs set out in detail well tested methods to teach a given mathematical topic	Once teachers have identified 'key difficulty points' they plan to address these carefully in teaching. For example, they may know that children sometimes think a shape divided into 4 is always divided into quarters, and so would teach 'divided equally' (the concept) and the non-concept). They would look at images of each and identify that only those 'divided equally' into 4 are quartered.							✓
Teachers include a variety of representations need to introduce and explore a concept effectively	In the above example, teachers would explore several different ways of 'dividing equally' into 4; starting with shapes (e.g. divided across, down, diagonally). They would then extend to look at equally dividing sets of objects into 4, equally dividing continuous quantities into 4 (e.g. liquid) to explore the concept in depth.							✓
Teachers set up related Teacher explanations and questions to pupils	Teachers have identified what the potential misconceptions are, and carefully plan 'hinge questions' to test for these in children.							✓
Any comments on lesson design: Year One have been spending time embedding "S planning" & time discovering & making different representations								
Teachers are clear that their role is to teach in a precise way, which makes it possible for all pupils to engage successfully with tasks at the expected level	Teacher use clear pre shared language (e.g. 'this is the whole, this is the part of the whole' in a lesson on fractions), have fully thought through the models and explanations they will use, and believe that this will enable all children to develop as mathematical thinkers and so succeed							✓
Pupils work on the same tasks and engage in common discussions.	There is little in the way of differentiation as we know it.							✓
Concepts are often explored together to make mathematical relationships explicit and strengthen pupils understanding of mathematical connectivity	For example, in lessons, the teacher and children will highlight several different approaches to solve the same calculation (e.g. $29 + 19$ could be solved by partitioning, or by $29 + 20 - 1$ , or by $30 + 20 - 2$ etc.) which would be discussed as a whole class. The Chinese call this 'active argument'.							✓
Precise questioning during lessons ensures that pupils develop fluent technical proficiency and think deeply about the underpinning mathematical concepts.	Teachers plan questions to build depth as well as fluency, e.g. how can we use the idea of 'same difference' in subtraction to solve $82 - 64 = 78 - \underline{\quad}$ without having to calculate that $82 - 64 = 18$ .							✓
Any comments on teaching methods: Year One needs more evidences to show greater depth.								

**Figure 2.** Extract from Charlie, Frances and Laurie's audit tool at a TRG meeting, May 2nd 2018.

meetings and training sessions. One instance where I observe the audit being completed is in a TRG meeting in May 2018, attended by Laurie (maths subject leader), Frances (middle leader) and Charlie (teacher). Charlie, Frances and Laurie jointly discuss the audit tool, selecting what they feel it is important for Highland School to focus on in terms of adopting Maths Mastery (for example, see [Figure 2](#)). Through collective deliberation, the teachers make inclusions and exclusions of focus areas. Specifically, these teachers choose to focus on three of the NCETM's 5 Big Ideas: variation, fluency and coherence. These selected areas of focus are taken back to Highland School by Charlie, Laurie, Joss and Frances. They do this in different ways:

I'm going to discuss this with [the headteacher] and re-do the school development plan. – Frances

I'm going to study each year group's planning tool with year group teachers and see what will work best. – Laurie [TRG, fieldnote, May 2nd, 2018]

Charlie teaches her own class using the approach and offers guidance to others through reflections on her experiences. Frances and Laurie run staff meetings which train teachers in the selected aspects of the approach. Laurie and Joss discuss actions planned with senior leaders of the school, feeding into school development planning.

From an ANT perspective, government funding 'moves' and textually mediated training initiatives continue the *translation* of Maths Mastery from 'global' initiative into networks of practices at different school sites (Hamilton 2009). Rather than entering these networks as one policy document, the initiative is distributed, supported by funding, into a variety of sponsored training programmes. Access to the ideas of the initiative is increased, allowing Maths Mastery to promulgate through the network of school practices for the teaching of maths. Within these training programmes, texts represent and carry the policy initiative. Texts such as an NCETM audit tool serve as key actors in the realignment of the goals of (human) actors and the other actors they associate with – school development plans, the headteacher, year group planning tools, teachers, and so on. The audit tool provides a frame for the teachers' thoughts. Its short paragraphs next to evaluative statements provide the (Maths Mastery-based) parameters for teacher agency in discussions of practices relating to mathematics. The audit may thus be seen as a 'a key mediating mechanism between local interactions and system goals' (Hamilton 2009, 221). This mechanism establishes teacher agency, remodelling it through 'material arrangements, systems of measurement' (Callon and Law 2005, 718). Funding and textual actors such as the NCETM audit tool become artefacts at the centre of a nexus of practices – it determines the direction of the change to school practices. *Interessement* becomes a composite effect of the ordering of many human and material actors (Latour 1999); with funding and policy texts hard at work in the various opportunities offered by the DfE and DfE-funded NCETM training events.

## Discussion

Unlike many statutory government policies, which arrive in schools represented in one policy document, this policy initiative enters the network of practices at Highland School

as distributed; a composite of many human and material actors (Latour 1999). In distributed form the ‘idea’ of Maths Mastery promulgates. It enters the network in association with powerful allies – an *assemblage* of statutory government policy texts which are already established as *obligatory passage points* in the network. *Problematization* of existing practices occurs in relation to these texts, echoing studies which report on the foundations of much educational reform as rooted in (changes in) government policy (Apple 2006; Stronach et al. 2002). This resonates with discourses of performativity (Gewirtz et al. 2021) in which systems designed to standardise, measure and publicly reveal school performance to government-defined aims drive decisions around school practices – the non-statutory initiative is positioned as a ‘solution’ to a problem identified through statutory policy.

The ‘power’ of Maths Mastery is strengthened through a series of government funding projects and textual actors which reify the approach, *mediating* the agency of other actors – of teachers, of further texts and materials; of, ultimately, pupils. The agency of these actors is interrupted through a manner of *interference* (Latour 1999), realigning goals and the parameters of agency into the ways of Maths Mastery. Thus, this distributed method of policymaking may be seen *not* as an empowerment of front-line power and agency implied in its non-statutory nature (which suggests that schools may choose not to implement the approach), but rather as a new mode of government control. This is a ‘back door’ approach in which funding and associations between non-statutory and statutory policy construct a sense of authority and requirement around the optional initiative.

ANT offers a way of expanding the possibilities of describing the relationship between policy and schools’ practices. ANT’s tools enable tracing of how actors position each other, how control, power and agency in this relationship are established. This is a perspective which presents challenges, but also potential to school leaders. For if we can understand how control, power and agency are produced, we may also perhaps interrupt the actor-networks that constitute them. We may thereby interrupt iterations of control, power and agency to sculpt a different shape of educational practices that has confidence in and honours teacher professionalism in meeting the diverse demands of the twenty-first century.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

## Notes on contributor

**Ruth Unsworth** is a senior lecturer of Initial Teacher Education at York St John University and a recent Ph.D. graduate at Durham University. Over the past 20 years, Ruth has held teaching, leadership and consultant roles in primary education in the UK and internationally. Her research interests and publications centre around the actor-network theory, psychoanalytic theory and ethnographic explorations of the relationship between global education policy and teachers’ classroom practices.

## ORCID

Ruth Unsworth  <http://orcid.org/0000-0002-4900-3590>

## References

- Apple, Michael W. 2006. "Understanding and Interrupting Neoliberalism and Neoconservatism in Education." *Pedagogies: An International Journal* 1 (1): 21–26. [https://doi.org/10.1207/s15544818ped0101\\_4](https://doi.org/10.1207/s15544818ped0101_4).
- Ball, Stephen J. 2003. "The Teacher's Soul and the Terrors of Performativity." *Journal of Education Policy* 18 (2): 215–228. <https://doi.org/10.1080/0268093022000043065>.
- BBC. 2016. "Pisa Tests: Singapore Top in Global Education Rankings – BBC News." Accessed June 19, 2022. <https://www.bbc.co.uk/news/education-38212070>.
- Bloom, Benjamin S. 1973. "Recent Developments in Mastery Learning." *Educational Psychologist* 10 (2): 53–57. <https://doi.org/10.1080/00461527309529091>.
- Boylan, M. 2018. "Where did Maths Mastery Come from?" Accessed July 13, 2021. <https://schoolsweek.co.uk/where-did-maths-mastery-come-from/>.
- Callon, Michel. 1986. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fisherman of St Briec Bay." In *Power, Action and Belief: A New Sociology of Knowledge*, edited by John Law, 196–232. London: Routledge & Kegan Paul.
- Callon, M., and J. Law. 2005. "On Qualculation, Agency, and Otherness." *Environment and planning D: Society and Space* 23 (5): 717–733.
- Ceulemans, Carlijne, Maarten Simons, and Elke Struyf. 2012. "Professional Standards for Teachers: How Do They 'Work'? An Experiment in Tracing Standardisation in-the-Making in Teacher Education." *Pedagogy, Culture & Society* 20 (1): 29–47. <https://doi.org/10.1080/14681366.2012.649414>.
- Department for Education and Skills (DfES). 2004. "Making Mathematics Count: The Report of Professor Adrian Smith's Inquiry into Post-14 Mathematics Education." Accessed June 19, 2022. <https://dera.ioe.ac.uk/4873/>.
- Department for Education [DfE]. 2010a. "Academies Act 2010." <https://www.legislation.gov.uk/ukpga/2010/32/contents>.
- Department for Education [DfE]. 2010b. "The Importance of Teaching." <http://www.educationengland.org.uk/documents/pdfs/2010-white-paper-teaching.pdf>.
- Department for Education [DfE]. 2014. "National Curriculum in England: Primary Curriculum – GOV.UK." <https://www.gov.uk/government/publications/national-curriculum-in-england-primary-curriculum>.
- Department for Education [DfE]. 2016. "Assessment and Reporting Arrangements". <https://www.gov.uk/guidance/2016-key-stage-2-assessment-and-reporting-arrangements-ara>.
- Edgerton, David. 2018. *The Rise and Fall of the British Nation*. London, UK: Penguin.
- Edgington, Ursula. 2016. "Performativity and Accountability in the UK Education System: A Case for Humanness." *Pedagogy, Culture & Society* 24 (2): 307–312. <https://doi.org/10.1080/14681366.2015.1105467>.
- Fenwick, Tara, and Richard Edwards. 2012. *Researching Education through Actor Network Theory*. Edited by Tara Fenwick and Richard Edwards. Sussex, UK: Wiley-Blackwell.
- Fisher, Trevor. 2008. "The Era of Centralisation: The 1988 Education Reform Act and Its Consequences." *Forum* 50 (2): 255–261. <https://doi.org/10.2304/forum.2008.50.2.255>.
- Gewirtz, Sharon, Meg Maguire, Eszter Neumann, and Emma Towers. 2021. "What's Wrong with 'Deliverology'? Performance Measurement, Accountability and Quality Improvement in English Secondary Education." *Journal of Education Policy* 36 (4): 504–529. <https://doi.org/10.1080/02680939.2019.1706103>.
- Gorur, Radhika. 2011. "Policy as Assemblage." *European Educational Research Journal* 10 (4), 611–622. <https://doi.org/10.2304/eerj.2011.10.4.611>.
- Hamilton, Mary. 2009. "Putting Words in Their Mouths: The Alignment of Identities with System Goals through the Use of Individual Learning Plans." *British Educational Research Journal* 35 (2): 221–242. <https://doi.org/10.1080/01411920802042739>.
- Hamilton, Mary. 2011. "Unruly Practices: What a Sociology of Translations Can Offer to Educational Policy Analysis." *Educational Philosophy and Theory* 43 (sup1): 55–75. <https://doi.org/10.1111/j.1469-5812.2009.00622.x>.

- Hargreaves, A., and I. Goodson. 1996. "Teachers' Professional Lives: Aspirations and Actualities." In *Teachers' Professional Lives*, edited by I. Goodson and A. Hargreaves, 1–26. London: Falmer Press.
- Hoyle, Eric. 1982. "The Professionalization of Teachers: A Paradox." *British Journal of Educational Studies* 30 (2): 161–171. <https://doi.org/10.1080/00071005.1982.9973622>.
- Latour, Bruno. 1999. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, Mass: Harvard University Press.
- Latour, Bruno. 2005. *Reassembling the Social: An Introduction to Actor–Network–Theory*. Oxford: Oxford University Press.
- Law, John. 1994. *Organizing Modernity*. Oxford: Blackwell.
- Law, John. 2009. "Actor Network Theory and Material Semiotics." In *The New Blackwell Companion to Social Theory*, edited by Bryan S. Turner, 141–158. Oxford: Blackwell Publishing Ltd.
- MacBeath, J. 2008. "Stories of Compliance and Subversion in a Prescriptive Policy Environment." *Educational Management Administration and Leadership* 36 (1): 123–148.
- Menter, Ian. 2009. "Teachers for the Future." In *Changing Teacher Professionalism: International Trends, Challenges and Ways Forward*, edited by Sharon Gewirtz, Pat Mahony, Ian Hextall, and Alan Cribb, 217–228. Oxon: Routledge.
- Moore, Alex, and Matthew Clarke. 2016. "'Cruel Optimism': Teacher Attachment to Professionalism in an Era of Performativity." *Journal of Education Policy* 31 (5): 666–677. <https://doi.org/10.1080/02680939.2016.1160293>.
- Mulcahy, Dianne, and Carol Morrison. 2017. "Re/assembling 'Innovative' Learning Environments: Affective Practice and Its Politics." *Educational Philosophy and Theory* 49 (8): 749–758. <https://doi.org/10.1080/00131857.2016.1278354>.
- Mulcahy, Dianne, and Suzanne Perillo. 2011. "Thinking Management and Leadership within Colleges and Schools Somewhat Differently: A Practice-Based, Actor–Network Theory Perspective." *Educational Management Administration & Leadership* 39 (1): 122–145. <https://doi.org/10.1177/1741143210383895>.
- Nespor, Jan. 1994. *Knowledge In Motion: Space, Time And Curriculum In Undergraduate Physics And Management*. New York: Routledge.
- Oancea, Alis. 2014. "Teachers' Professional Knowledge and State-Funded Teacher Education: A (Hi)Story of Critiques and Silences." *Oxford Review of Education* 40 (4): 497–519. <https://doi.org/10.1080/03054985.2014.939413>.
- Parliament of the United Kingdom. 1870. *An Act to Provide for Public Elementary Education in England and Wales*. London: Parliament of the United Kingdom.
- Peacock, Alison. 2017. "The Chartered College of Teaching: Professional Learning without Limits." In *Flip The System UK: A Teachers' Manifesto*, edited by Lucy Rycroft-Smith and Jean-Louis Dutaut, 94–101. London: Routledge.
- Pink, S. 2007. *Doing Visual Ethnography: Images, Media, and Representation in Research*. 2nd ed. London: Sage.
- Reeves, Jenny. 2007. "Inventing the Chartered Teacher." *British Journal of Educational Studies* 55 (1): 56–76. <https://doi.org/10.1111/j.1467-8527.2007.00365.x>.
- Sockett, Hugh. 1993. *The Moral Base for Teacher Professionalism*. New York: Teachers College Press.
- Stronach, Ian, Brian Corbin, Olwen McNamara, Sheila Stark, and Tony Warne. 2002. "Towards an Uncertain Politics of Professionalism: Teacher and Nurse Identities in Flux." *Journal of Education Policy* 17 (1): 109–138. <https://doi.org/10.1080/02680930110100081>.
- Tomei, Anthony, Justin Dillon, and Emily Dawson. 2014. "United Kingdom: An Example of the Impact of High Stakes Accountability Regimes on STEM Education." In *The Age of STEM: Educational Policy and Practice across the World in Science, Technology, Engineering and Mathematics*, edited by Brigid Freeman, Simon Marginson, Russell Tytler, 161–177. London: Routledge.
- Whitty, G. 2006. "Teacher Professionalism in a New Era." Paper Presented at the First General Teaching Council for Northern Ireland Annual Lecture, Belfast. Belfast, Northern Ireland.

- Wright, S. 2015. "Exploring Actor–Network Theory and CAQDAS : Provisional Principles and Practices for Coding, Connecting and Describing Data Using ATLAS.ti." In *ATLAS.ti User Conference 2015 – Qualitative Data Analysis and Beyond*, edited by S. Frieze, 1–31. Berlin: Repository of Technische Universität Berlin.
- Yorkshire Purchasing Organisation (YPO). 2022. "Five Things You Should Know about Singapore Maths." Accessed June 19, 2022. <https://www.ypo.co.uk/news-and-events/blog/five-things-you-should-know-about-singapore-maths>.