PART 1

GLOBALISATION, THE OECD AND THE ROLE OF POWERFUL INTERNATIONAL SURVEYS

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1. IMAGINING LITERACY

A Sociomaterial Approach

LITERACY AS A KEY ASPECT OF THE MODERN SOCIAL IMAGINARY

This chapter presents a theoretical model for analysing the different ways in which literacy is represented in policy, media discourses and everyday practices. There are many ways in which people have tried to define and explain how literacy functions in individual lives and in society, asserting its usefulness for the state and for other social and economic institutions. Over time and in different contexts, literacy has been imbued with a wide variety of aims: religious, moral, cultural and emancipatory. It has been enlisted to support nation building, wealth creation and universal human rights. As a term, literacy is elastic and slippery and it can be made to carry all kinds of hopes, judgements and expectations. These narratives about literacy are part of what shapes literacy education in different historical eras and places. They circulate in many places – in policy documents, in the news and popular media, but also in everyday social interactions in homes and classrooms. An interesting example of the way public discourses cross over to powerful effect can be found the forward to the 1999 report *Improving Literacy and Numeracy: A Fresh Start* which set the ground for the *Skills for Life* policy in England (Moser, 1999). In this forward, Claus Moser quotes from *The Reader* a novel by Bernhard Schlink (1998) which was widely popularised by United States (US) talk show star, Oprah Winfrey. Moser uses the novel to make the point that "illiteracy is dependence" and to claim that literacy offers liberation and independence (see Johnson & Finlay, 2001). Adult literacy policy and publicity often carries this message which encourages people to imagine themselves as being in a deficit state and in need of help even though they do not necessarily share this vision.

This vision of literacy which Brian Street has called the autonomous view, sees reading and writing as a set of individual cognitive skills, possession of which has universal effects (Street, 1984). In fact, the abilities and opportunities to read and write the printed word are woven into everyday patterns of social practice in locally specific ways. These patterns are diverse, varying with linguistic and cultural contexts, the availability of different materials and technologies for communication, and the use and valuing of other semiotic systems for representing meaning. This makes for a dynamic landscape of practice within which educational policy and practice takes place.

The narratives we have developed about literacy help to organise and control this diverse and changing landscape. They facilitate interventions into it in the form of educational and social policy reforms. Some of these narratives are so familiar that it is difficult to get beyond them and the contradictions they embody to think in a fresh – perhaps more effective – way about the power of the written word. These narratives about literacy are also tightly integrated with others in adjacent areas of social life, linked for example, with views about citizenship, poverty and culture. This compounds their hold over our imagination and ways of thinking. Charles Taylor (2007) refers to this as the 'social imaginary': an implicit map of social place and relations which forms a horizon we are virtually incapable of thinking beyond. Because of their power to organise thinking it is crucial to examine these narratives – that is, to study the politics of representation. This includes analysis of how these public narratives emerge in different media and social domains (from policy texts to novels); how social actors (whether employers, teachers, media celebrities or parents) mobilise around them; how they are linked with other common cultural narratives and how they themselves contribute to the work of literacy in contemporary societies. Whilst similar processes occur in other areas of social life, in my book (Hamilton, 2012a) I argue that literacy is significantly implicated in our contemporary social imaginary and this is reflected in the stories we currently tell one another about reading and writing. Research itself carries particular visions of what literacy is and so it is important for scholars also to make the theories they use explicit to themselves and others.

Literacy has always been diverse because it is rooted in the cultures and languages that learners and users bring to written communication. These affect the resources, power relations, and identities produced (e.g. Street, 2005). Literacy is by nature multi-lingual and part of processes of social ordering. Sociologist Dorothy Smith (2005) explains literacy's co-ordinating role in what she terms 'the textually-meditated social world' and a number of researchers assert that this role is intensifying in contemporary society (e.g. see Iedema, 2003). Literacy is changing rapidly as linguistic and cultural groups move and intermingle as never before (Blommaert & Rampton, 2012; Kalantzis & Cope, 2012; Pennycook & Otsuji, 2015). Lankshear and Knobel (e.g. 2008) foreground the development of digital forms of communication as a key driver of these changes, which have recast existing forms of written communication and – it can be argued – create new literacies specific to digital environments. There is considerable ambiguity around the term 'digital literacies' (see Gourlay, Hamilton, & Lea, 2014), which are sometimes interpreted to mean general competence with digital devices. However, if we define the term as the ways in which meaning-making resources are used and produced in on-line settings, then the relationship with print literacies becomes clearer and the implications of digital technologies for literacy learning and teaching are key.

Literacy currently has a high profile within national and international policy because of the human resources view of the centrality of skills and training to prosperity which is promoted strongly through the Organisation of Economic

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Co-operation and Development (OECD). The human resource model of education sees literacy as a commodity to be exchanged within the global market place. It asserts that large sections of the adult population need to be 'upskilled' to cope with the rapidly changing competitive global environment, linking literacy directly with economic development, individual prosperity and vocational achievement in what are claimed to be universal relationships. This 'literacy myth' identified by Harvey Graff more than 30 years ago has, if anything, been re-inscribed more securely into international policy, despite much evidence that it oversimplifies and therefore is unlikely to deliver the outcomes it promises (see Graff, 2010). This human resources view of literacy learning that has dominated recent policy initiatives produces a moral order of literacy which organises our understanding of different sites of learning, the people active within them and the different forms of learning in which they engage. Formal learning is privileged over informal learning, standardised and measurable outcomes are preferred for demonstrating achievement. The 'good' literacy learner is constructed as a responsible citizen contributing to global prosperity. The autonomous approach to literacy is thus alive and well in the context of international policy discourse, where it is conducive to defining measurable skills that can be commodified within social development. I and others have called this a move to 'literacy as numbers' (see Hamilton, Maddox, & Addey, 2015).

HOW LITERACY HAS BEEN THEORISED AND UNDERSTOOD – CONTINUITIES AND CHANGE

The autonomous view of literacy described above has been widely and effectively critiqued over the last 30 years (see Barton, 2007; Collins & Blot, 2003) as creating an oppressive great divide between those who are seen to be literate and those who are not. This view is an ethnocentric one that focuses attention on alphabetic literacies and has been part of western colonial practices.

Scholars and practitioners critical of this dominant approach, have developed alternative analyses of literacy in terms of how it interacts with power relations and developed pedagogies that challenge these relations in order to emancipate rather than domesticate literacy learners (see Freire, 1972; Giroux, 1988; McLaren & Lankshear, 1993). A view of literacy as situated social practice takes up this interest in power relations but puts the opportunity to realise the diverse expressions of literacy at the centre of its emancipatory project, moving beyond the confines of formal education in order to explore these. Scholars working in this tradition view the meanings and values of literacy as contingent and situated, shifting according to context, purpose and social relations (Bartlett, 2008; Barton, Hamilton, & Ivanič, 2000; Brandt, 2005; Gee, 1990; Heath, 1983; Scribner & Cole, 1981; Street & Lefstein, 2007). They have described the vernacular, everyday practices of reading and writing and have generated a large body of ethnographic work, offering rich descriptions of situated literacy practices involving various print, digital and/or otherwise multimodal resources among different groups (e.g. Barton & Hamilton,

2012; González, Moll, & Amanti, 2013; Gregory & Williams, 2000; Pahl & Rowsell, 2006; Street, Pahl, & Rowsell, 2009).

This distinct approach – referred to in this article as 'literacy studies' – has developed alongside sociocultural theories of learning that foreground the social, acknowledging the role of informal learning and the multiple spaces of learning (see Gutierrez, 2008; Lave, 1988; Lave & Wenger, 1991; Scribner & Cole, 1981). There have also been parallel developments in theories of discourse that link language with action and social structure (Fairclough, 2013; Scollon, 2001). Fairclough and other critical discourse analysts assume that discourse plays a key role in social change. Change is 'talked into being' through discourses such as 'illiteracy as deficiency'. These discourses "shape and reshape" social reality (Chouliaraki & Fairclough, 1999, p. 4); they are part of the way people act together (and against one another) in the world in habitual ways (p. 21). Chouliaraki and Fairclough do not argue that all social life is discourse but that discourse is one constitutive element of social practices, along with action and interaction, social relations, persons and the material world (see also Fairclough, 2003, p. 25).

Developments in our understanding of literacy in social life and the worlds of new media have inevitably led to a broader understanding of literacy as part of semiosis, meaning-making and material representative practice. Kress (2009), for example, argues that social semiotic theory is essential for understanding the place of literacy within other meaning-making systems (see also Jewitt & Kress, 2003; Menezes de Souza, 2008). A social semiotic approach to discourse offers a vocabulary for analysing the properties of texts including the visual multi-modal aspects of the digital including number (van Leeuwen, 2008). Like the theory of literacy as social practice, social semiotics puts the concept of situated practice at the centre of the analysis of discourse, and sees the producer of meaning as actively choosing from and assembling semiotic resources of all kinds. Different semiotic resources have different affordances, or potentials for action which are realised differently in different contexts (see also O'Halloran, 2008). Van Leeuwen (2008) is interested in social categories of meaning that may be realised in a variety of ways using linguistic and these other semiotic resources to 'recontextualise' social practices. This enables analysis of the specifics of how language and other meaning-making resources are chosen and combined and are active within the broad social landscape described above.

New views of literacy as social practice have gained solid ground within academic research and practice communities, and critical literacy approaches have remained strong in international education and development programmes. However, the autonomous view has retained its power within much policy and assessment. A view of literacy as a stable set of information processing competences exercised within different contexts is firmly embedded in the international surveys that hold increasingly important place in the imagination of policymakers and the general public across many countries (see Hamilton, Maddox, & Addey, 2015). How is it possible to understand and resolve these contradictory positions and the hold they

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have over different parties who care deeply about the future of literacy? I hope to contribute to such an understanding in the next section of this chapter.

A SOCIOMATERIAL APPROACH TO LITERACY

Scholars of literacy studies have concentrated on describing the vernacular, everyday practices of reading and writing. They view institutions as selecting and privileging certain practices and policy regimes are one example of this. However, to date literacy studies has not elaborated much on the institutional processes involved in such privileging (Brandt & Clinton, 2002). The tools and methodologies of Science and Technology Studies (STS) and the material semiotics of Actor-Network Theory (ANT) can supplement and strengthen the insights of literacy studies to help us get a better grasp on the role of literacy within individual, collective and institutional life and to understand the contradictory strands of literacy that are in play. Building on Foucault's work on the geneology of social orders (Kendall & Wickham, 1999) ANT scholars have focused on the social, material and institutional processes that accompany specific technological innovations (see Callon, Lascoumes, & Barthe, 2009; Latour, 2005; Law, 1994 for clear introductions), exploring the performative, embodied 'doing' and 'making' of technologies and the multiple or collateral realities that are created in the process of realising a social innovation (see Law, 2013; Mol, 2002); They are concerned with the 'back-room' and often invisible workings of these projects, their failures as well as their successes. Their ideas can be applied to educational policies which can be seen as social projects that aim to organise and make tractable diverse everyday lived experience by applying new technologies of governance (see Fenwick & Edwards, 2010; Fenwick, Edwards, & Sawchuk, 2011; Hamilton, 2011). A socio-material approach to literacy therefore can explore how literacies are assembled through public discourses and materialised through everyday, educational testing and policy practices.

In the case of the international assessments of literacy, this involves conceptual discussions about how international literacy data is produced, for what purposes and under what systems of transparency and accountability – a move towards what Gorur (2014) has called 'a sociology of measurement in education'. It pays attention to the networks of people and things through which international assessments are assembled; the agencies that function as 'distant centres of calculation' and their invisible background work constructing and maintaining the performance of literacy as numbers. It focuses on the delegation of agency to assessment artefacts and procedures and the processes of change whereby social innovations become stable and naturalised so that they are no longer questioned.

Rather than seeing society as a set of structures within which individuals exert agency, ANT views it as a fluid space within which competing projects of social ordering (such as a scientific innovation or a government policy initiative) gather or lose influence. A project of social ordering is more or less powerful dependent on the size of the network of actants (both people and things) that gathers around it. Social

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projects are not stable but are constantly emerging and also unravelling through everyday activities.

Such a view of social reality seems particularly apposite to the field of adult literacy given the contradictory context described above. We can see literacy being assembled as part of different projects of social ordering of which international tests are just the latest development. Policy strategies which come and go within national spaces are social projects in the making. In the case of the *Skills for Life* strategy in England, it is illuminating to follow it across the decade when it had the backing of a powerful actor network – a national government and its associated agencies together with international alliances – to the present when in a period of economic austerity and under a different political administration, this project is no longer being sustained and some of its achievements are already falling into disrepair despite the continuing strength of international influences.

While this approach emphasises the socio-material aspects of practice, it also acknowledges that in the creation of new social projects, a great deal is accomplished at the discursive level of social action. In other words, texts are seen as part of what constitutes socio-material practices. They are devices through which realities are framed and shared so that material effects travel through and with them. Texts are not inert beings but have real effects when they are activated through networks. Both literacy studies and sociomaterial theory thus maintain that artefacts, of which texts are a significant category, are integral to moment by moment social interactions, acting as points of contact and fixity for developing shared meanings within the flow of social life. Artefacts, then, have both material and semiotic aspects and as Burgess (2006, p. 9) notes, the events within which these artefacts are embedded can be seen as "analytical doorways into an understanding of social systems" (see also Burgess, 2008).

Sociomaterial theory uses ethnographic methodologies to analyse the trajectory of a project of social ordering, the flow and concentration of resources within this project through the enrolment of actors in networks. A key aspect of this methodology is to track the ways that artefacts (Latour calls these 'immutable mobiles' – see Law & Singleton, 2005) circulate through organisational structures, connecting different actors or agents and shaping specific social interactions in ways which tangle people in the very processes they also resist, a feature Callon (1986) calls 'interessement'. Artefacts mediate a number of key processes: *translation* which is the realisation of equivalencies between disparate entities in order to enrol them into the social project being developed; *deletion* of features seen as insignificant to the social project. ANT therefore has particular affinities to literacy and discourse studies through the notion of 'immutable mobiles' and through its emphasis on the 'framing' of competing social projects which, it claims, is accomplished through socio-material practices of which discourse is one dimension.

Latour (2005) has identified two further processes which help make the link with complexity theory more generally. The first consists of localising moves in which actors interpret and adapt general categories in the light of local contexts,

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making locally appropriate choices among a set of options. The second, on the other hand, consists of globalising connects, which align local actors with collectives; synchronising individual actions with those of others. Such moves fit with the notion of glocalisation espoused by social complexity theorists. John Urry explains this as follows, emphasising the two-way flow of influence between local and global:

> Within the phase space of various possibilities, the trajectories of many social systems worldwide are increasingly drawn into the attractor of "glocalisation" … By this I mean that there are parallel, irreversible and mutually interdependent processes by which globalisation-deepens-localisation-deepens-globalisation and so on. The global and local are inextricably and irreversible bound together through a dynamic relationship, with huge flows of "resources" moving backwards and forwards between the two. Neither the global nor the local exists without the other. The global-local develops in a symbiotic unstable and irreversible set of relationships in which each gets transformed through billions of worldwide iterations dynamically evolving over time. (Urry, 2003, p. 84)

Urry's vision of social complexity emphasises the 'flows' of social and material events – agency is constantly shifting, social formations and networks are malleable. However, he also acknowledges the importance of the moorings around which institutional processes can be anchored. The framework of sociomaterial theory enables us to look at a range of glocalising mechanisms at work in the adult literacy context and in my own research I have focused especially on texts which, as a powerful class of 'immutable mobiles', may act as 'moorings' within global flows and networks. I have used both discourse analysis to focus on the policy texts (e.g. Hamilton & Pitt, 2011a, b) and sociomaterial theory to assemble, trace or excavate ethnographic evidence of their associated practices (Hamilton, 2009, 2011). In the final section of this chapter I summarise some of this work and related studies to show how these ideas can be applied to literacy.

CIRCULATING DISCOURSES OF LITERACY

It is possible to identify and analyse public discourses that have framed and 'stabilised' the problem of adult literacy at different points, and search for voices and silences. To illustrate this I will refer to two related examples: the assembling and unravelling of the *Skills for Life* policy mentioned above and the development of international assessments of adult literacy through the International Adult literacy Survey (IALS) and the Programme of International Assessment of Adult Competences (PIAAC).

This analysis, presented in more detail in Hamilton (2012a), involves a critical discourse analysis of key documents produced by the government and the media, accounts from key people and my own experience as a researcher in the field. Stories, or narratives, are not just expressed in the form of words. In the *Skills for Life* strategy, a great range of media were used: The Get On! campaign used Gremlin figures to encourage people to sign up for literacy and numeracy classes (see Hamilton &

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Hillier, 2006). There were many kinds of associated logos and artefacts used in the campaign and images of successful learners were also circulated widely along with their testimonies of how literacy classes had changed their lives. The Gremlins also carried a kind of metaphor about literacy as a monster or demon to be struggled with and overcome and other metaphors were coined by policy makers and practitioners, such as 'spikey profiles' to describe the uneven competences of adult learners, 'the hard to reach' and the 'low hanging fruit' to talk about how difficult or easy it was to engage with different learners.

The other pervasive way in which narratives about literacy are expressed is through the use of numbers and statistics. Looking at how literacy and literacy learners are represented in policy documents shows that numbers are used to create narratives and to make arguments throughout, using statistical findings and visualisations such as tables which are used to relate numerical categories to many other different kinds of information.

This is illustrated in the government document announcing the *Skills for Life* strategy (Department for Education and Skills [DfES], 2001). New measurements of literacy generated by national and international research had produced increased estimates of the need for adult literacy from two to seven million adults. This figure is used to justify committing public funding to this policy area and is re-iterated many times through the 58 page strategy document (seven times as an overall figure and a further twenty times as the basis for estimates of subgroups in need of help). This figure was also widely reported in the media at the time. The neoliberal economic discourse familiar to this period is drawn on in the document to equate a lack of literacy with reduced employability and earnings and a threat to national prosperity:

> A shocking seven million adults in England cannot read and write at the level we would expect of an eleven-year-old. Even more have problems with numbers. The cost to the country as a whole could be as high as £10 billion a year. The cost to people's personal lives is incalculable. People with low basic skills earn an average £50,000 less over their working lives, are more likely to have health problems, or to turn to crime. (David Blunkett, Secretary of State for Education in his foreword to *Skills for Life*, DfES, 2001)

In the strategy specific groups of adults are targeted as a 'priority' for literacy education, all of whom are characterised by negative attributes. These include unemployed and low skilled, short-term workers; benefit claimants, especially lone parents; homeless and those living in disadvantaged communities; prisoners and those on probation, those with drug and alcohol problems, mental health issues; refugees and other non native English speakers. The specification of such groupings, and the new discourses associated with them mark struggles between governments' desires to control their unruly populations at times of economic and social change, as well as to provide support for them. The groups represent the latest incarnation of an underclass that has been constructed by successive governments (see Welshman, 2006). Discourse theory argues that categorisations like this are social labels that

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bring into being and maintain certain kinds of subjectivity (Pitt, 2002; Rose, 1989; Smith, 2005). The *Skills for Life* document introduces these new categories into the field of adult education, obliging British providers to focus their programmes on those who can be fitted into one of the groups described.

We can see in this example the important process of the discursive configuring of the policy space and the people within it. In Hamilton (2012b) I looked at other relevant dimensions of this public discourse including discourses defining literacy itself, discourses of learning and discourses of citizenship.

In the *Skills for Life* policy, literacy is referred to as 'basic skills' aligning it with vocational discourses. It is assumed that literacy tuition is always in English despite the fact that there are many different language varieties now in use across communities in the UK. Understandings about the diversity and situatedness of learning are constantly eclipsed by the preoccupation with institutional systems and standards (Hamilton, 2009) leaving informal learning spaces marginalised – either by being drawn into the procedures and scrutiny designed for more formal settings or by being left out of these systems to their own devices

Duty to learn becomes an obligation and a condition for benefits. In the case of adult literacy, views about rights and responsibilities for learning – who should pay, who is entitled and what kind of literacy is appropriate – are currently changing. These changes can be clearly traced by comparing current ideas with those expressed in the early days of the 1970s literacy campaign (see Hamilton & Pitt, 2011a). Dwyer (2004) has documented the prevalence of a discourse of conditionality across a wide area of contemporary social policy, both national and international. He suggests that this signals an underlying shift in thinking about citizenship and that this has material effects on the resources made available to different groups (such as welfare payments) as well as the educational opportunities on offer to them. In this example of the *Skills for Life* policy we can see how public discourses converge and flow across the domains of media, policy and enter the everyday where the lived experience of literacy may be very different from the ways in which it is talked about and justified.

The statistics used to promote the *Skills for Life* policy were produced from a mixture of home-grown national assessments and results from the International Adult literacy Survey (IALS) carried out by the OECD (2000). Comparative surveys like the IALS are increasingly ordering our knowledge of literacy across countries through the actions of apparently distant agents like the OECD and this makes them a prime site for applying a sociomatieral approach. Gorur (2011) does this by identifying steps in the construction of such surveys through which divergent realities and knowledges are translated into numerical test scores turning 'matters of concern into matters of fact' (Latour, 2004). The steps she describes are:

- What and Who to Measure?
- Choose items to represent domains of knowledge
- Translate these across cultures and languages

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- Choose a sample to represent the population
- How to measure and interpret findings?
- Agree on methods of data collection
- Apply statistical techniques
- Interpret indicators.

Researchers are beginning to investigate how these significant translations take place. Maddox (2014, 2015) has carried out ethnographic studies of test item construction and of the actual testing interactions that take place when teams from the testing agency enter peoples' homes. O'Keeffe (2013) takes the study of test interactions in a different direction by following the process of e-assessment used by the newest test of adult literacy, the Programme for the International Assessment of Adult Competencies (PIAAC). He uses methods of trace ethnography (Geiger & Ribes, 2011) to reconstruct the decisions and procedures encoded in the testing software, and shows how teacher agency is effectively delegated to the technology with a variety of consequences.

In tracing the life of an international test like the IALS or the PIAAC, we can also look at what happens next, at the ways in which the findings are reported and displayed in various formats to a range of audiences: the generic and specialist educational media, the research and policy communities via reports and policy briefings. Guidelines are developed for teachers alongside derivative instruments for use in national contexts. Visualisations are key to this stage of translation.

The results are read by people in different countries, both those that participate in the surveys and those that do not. This stage of translation through policy diffusion is also attracting research attention. Achieving 'buy-in' from the different national governments, creating a global community of competitors (see Rizvi & Lingard, 2010) is a key task for the OECD. Grek (2015) focuses on the main institutional players involved in developing international assessments – the OECD, the European Union (EU), the United Nations Educational, Scientific and Cultural Organization (UNESCO) – and the relationships between them. She describes the growing convergence between them as the assessments become stabilised as a recurrent feature of the policy landscape.

In her work on policy borrowing Steiner-Khamsi describes the international tests as a global solution in search of local problems and draws attention to the phenomenon of policy tourism as national governments rush to find out about the educational systems of the league leaders in order to inform their own policies (Steiner-Khamsi & Waldow, 2011). Addey (2015) explores the growth of international assessments in lower- and middle-income countries and what lies behind a country's decision to participate. She concludes that they employ strategies of both 'scandalising' and 'glorifying' their positions in the league of international assessment findings (Steiner-Khamsi, 2003) and form 'a global ritual of belonging'.

Using such analyses we can follow the actors, the artefacts and the discourses as the surveys travel through media, policy and educational practice in national

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contexts that are by turns enthusiastic, variable or indifferent in their response to the findings. Pinsent-Johnson (2015) and Atkinson (2015) report from Ontario, Canada, on the reception of the IALS findings in a context that is highly supportive of OECD policy intentions. In this case, the literacy framework used in the international test is taken directly into educational practice through the development of curricula and screening tests based on it. This takes the survey beyond its original intended arena of application and both authors argue that this has negative effects on pedagogy and inequality among adult literacy learners.

Using data from two case study countries in Europe, Germany, Switzerland, Beiber, Martens, Niemann and Teltemann (2015) explore how far responses to the findings from PISA can be detected in educational policy. They look at how school reforms, in autonomous governance, curriculum and standards, have materialised in line with recommended OECD policy and conclude that the picture is very variable depending on the existing educational context and political constraints.

A study carried out by Evans, Hamilton and Yasukawa (in preparation) on the media coverage of the PIAAC findings in October-December 2013 focused on several countries placed differently in the PIAAC league table. The analysis from the UK offers an example of an indifferent response to this survey of adult skills. Detailed coverage was restricted to just a few articles carried in the two days immediately following the release of the findings, with data displays and items, quickly decaying to repeated headlines which are then incorporated into existing wider debates and blur into other survey findings – in this case issues about the curriculum and school-based examinations. Although the findings put the UK around the average of countries tested, the media adopt a language of catastrophe. The findings are not just reported in terms of other reference countries (Schriewer & Martinez, 2004) but are used to tell an intergenerational story about declining standards of literacy within the UK – a story that is highlighted in the OECD's country summary. Departing from the OECD's guidance, however, the three key dimensions of the PIAAC survey were unevenly reported with most focus on literacy and some on numeracy. While digital technologies are emphasised in the test itself, the media coverage and subsequent debate equates literacy with print and with 'reading books' ignoring other media and textual genres. The lifelong learning orientation of the PIAAC is completely overshadowed by a preoccupation with children and schools and, like the other national contexts we analysed, the voices of experts are everywhere dominant.

These examples show how the meanings and effects of literacy are assembled through public discourses and material strategies that reflect the agendas of particular interest groups whether politicians, teachers, advocates, religious leaders or psychometric experts This chapter has argued that, of the available theories of literacy, a sociomaterial approach can most productively describe and analyse this diversity enabling us to better understand and effectively intervene in educational projects whether local, national or international.

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2. POLICY MAKING AT A DISTANCE

A Critical Perspective on Australia's National Foundation Skills
Strategy for Adults

INTRODUCTION

2012 marked a milestone in adult literacy and numeracy policy making in Australia. In September of that year, at an electronics factory outside Adelaide, South Australia, the Parliamentary Secretary for Higher Education and Skills unveiled a National Foundation Skills Strategy (NFSS) for Adults (Standing Council on Tertiary Education, Skills & Employment [SCOTESE], 2012), the first major national policy initiative in adult literacy and numeracy in over 20 years. Although there was little media fanfare surrounding the release of the Strategy, it was nevertheless more than two years in the making from the time the initiative for the Strategy was first made public.

The Strategy is a 32 page document, with a Foreword by the then Minister for Tertiary Education, Skills, Science and Education, Christopher Evans, whose opening remark is:

> More than 7.5 million Australian adults do not have the literacy and numeracy skills needed to participate fully in today's workforce. (p. i)

He then states:

> We know that the jobs of the future will increasingly be highly skilled and will require higher levels of training and education.

> We know that it is imperative that more Australians are able to access quality training to improve their language, literacy, numeracy and employability skills. (ibid.)

Further on in his Foreword he states that the national, state and territory governments "have set a target that by 2022, at least two-thirds of working age Australians will have the literacy and numeracy skills needed to take full advantage of opportunities afforded by the new economy" (ibid.). He concludes by stating that the Strategy "will guide national, collaborative and jurisdictional efforts to equip the Australian workforce for the future Australian economy" (ibid.) and complement efforts underway in other education sectors.

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The Strategy emerged as a response to a demand for policy renewal by a wide range of stakeholders, through numerous public consultations and lobbying, and support from some of the most powerful stakeholders. By the time the Strategy was released, a high level of consensus had been reached among some of the most influential stakeholders about what was needed to achieve the literacy and numeracy target in the Strategy. Indeed several of these stakeholders had already made significant investments, with government support, in research and development to ensure that their shared interests could be met. Why then does the Strategy have the effect of alienating some stakeholders in the field of adult literacy and numeracy, including the authors of this chapter? This chapter is in part our effort to understand this sense of alienation, not only towards the Strategy, but the discourse surrounding it. We aim to examine and explain what is in 'dispute' between how the Strategy represents the meanings and values of adult literacy and numeracy, and the meanings and values that we hold based on our own professional engagement in the field and research. In doing so, we show the construction of the unequal power relations involved in this dispute.

In the next section, we provide a brief explanation of who 'we' are and the perspectives that we bring to the work we do in adult literacy and numeracy, and outline the kinds of disagreement we have with the view of literacy and numeracy projected by the Strategy and the views informing not only our own work, but of those who share similar or complementary perspectives. In the third section, we outline some theoretical resources for investigating this disagreement, including Boltanksi and Thevenot's (1999) work on 'orders of worth' in different social worlds. The Strategy represents the achievements of a number of stakeholders coordinating their approaches and mobilising new tools and resources that leave little room for contestation. We introduce the theoretical resources that enable us to examine these tools and resources; these include Latour's (1987) Actor Network Theory (ANT) concepts of 'centres of calculation' and 'immutable mobiles', Bowker and Star's (1999) work on classification systems, and Thevenot's (1984) work on the significance and consequences of investing in 'forms'. In the fourth section, we trace key actors (people, groups, events, documents, technologies) in Australian adult literacy and numeracy from the time when the international Adult Literacy and Lifeskills (ALL) survey results for Australia were released in 2007 to the creation of the Strategy and its supporting resources (Australian Bureau of Statistics [ABS], 2007, 2008). The final section seeks to identify some lessons learned and discusses how an analysis such as this may begin to offer an effective counter discourse.

VOICES FROM THE MARGINS

So who are these alienated authors who are writing this chapter, and why is it so difficult for them to acquiesce to the dominant discourse on adult literacy and numeracy? Both of us are in privileged positions at the time of writing this of working in a University – Keiko as a teaching and research academic, and Steve as

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a researcher. While Keiko is involved in the teacher education of people entering the field of adult literacy and numeracy, neither she nor Stephen are under pressure to implement and comply with the instruments of the discourse represented by the Strategy.

In relation to the international adult literacy and numeracy research community, we are strongly informed by socio-cultural perspectives on literacy and numeracy as social practices. New Literacy Studies (NLS) ('New' has increasingly been dropped in recent years) which has evolved from works by researchers such as Street (1984), Baynham (1995), Barton and Hamilton (1998) and Baker (1998) have been significant influences in pointing us to ways of researching local literacies and numeracies in the particular situations where they are produced and used. Studies of practices as activity systems in the recent reformulations of Cultural Historical Activity Theory (CHAT) (Engeström, 2001) have also afforded us with further critical perspectives on literacy and numeracy, in particular as practices in activity systems in workplaces (Yasukawa, Brown, & Black, 2013, 2014) and vocational education and training (Black & Yasukawa, 2013).

The view of literacy and numeracy – or rather literacies and numeracies, that are produced, shaped and reshaped by people in their local practices in the home, community, workplaces as well as but not exclusively within formal educational institutions sits uncomfortably with initiatives that treat literacy and numeracy as something whose worth can be measured objectively. An example of an 'objective' measurement of literacy and numeracy is the International Adult Literacy Survey (IALS) which has now been conducted three times across many Organisation for Economic Co-operation and Development (OECD) countries, and has been the subject of critique by NLS scholars (see for example: Atkinson, 2012; Hamilton, 2001; Hamilton & Barton, 2000; Hamilton & Pitt, 2011). A key element of our alienation with the tenets of the Strategy stems from the all too eager appropriation of the results of the 2006 IALS – the Adult Literacy and Lifeskills (ALL) survey as the rationale for policy and policy-related responses. Aligning ourselves with those researchers cited above who have critiqued the IALS, we fail to see that such surveys can tell the story about the meaning of literacy and numeracy in people's lives.

As we will show in greater detail, the ALL survey has been largely responsible for spurring the review and realignment of a national assessment framework for adult literacy and numeracy, as well as new national competencies for adult literacy and numeracy teachers, trainers and assessors and also a new set of national competencies for learners in the vocational educational and training system. We will illustrate how the Strategy encapsulates the propensity by the literacy and numeracy 'industry' to build a unifying system of equivalences between the different instruments that the Strategy has spawned. This enables, for example, an internally consistent mapping of an adult learners' assessment using one tool to be mapped to levels used by another tool, that is, an equivalence between the ALL survey levels and the national assessment framework (known as the Australian Core Skills Framework – the ACSF). The question that is critical for us is not whether they are equivalent, but

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why it is important to achieve these equivalences, and what do these equivalences mean beyond achieving internal consistencies within the policy framework. What do these equivalences enable, and for whom? Why is it troubling while at the same time difficult to challenge?

RESOURCES FOR INVESTIGATING THE DISPUTE

Equivalences and Their Attractions

Boltanski and Thevenot (1999) provide a framework for analysing disputes and disagreements. When people are in dispute, they bring items and facts that each party tries to show is more worthy than what the other party brings. But they say that the worthiness that each party argues "must be justified with reference to a principle of equivalence which clarifies what they have in common", and this principle rests on the "mode" or "regime of justification" (1999, p. 361) that is assumed to be operating in the dispute. They argue that in analysing disputes, we need to recognise the particular kind of social world in which they are situated: each type of social world is characterised by the kinds of human qualities that are valued, the social relations that matter, the format of the valued information and the underlying measure of 'worth'. They identify, without claiming they are exhaustive, six social worlds: the world of inspiration, the domestic world, the civic world, the market world, and the industrial world. Each of these worlds has different regimes of justification that come to the fore in dispute situations, and worthiness of arguments is evaluated within the relevant regime. We summarise their characterisations of dispute settling in the industrial world in particular because as we argue, the Strategy and the surrounding resources operate on the basis of establishing equivalences according to the modes of justification of the industrial world.

Boltanski and Thevenot (1999) explain that in the industrial world, the mode of evaluation of worth is based on the notions of productivity and efficiency. In the industrial world, worthy people are those who are professionally competent and expert in their industry, the kinds of social relations that matter are those that establish and sustain functional links, and the information used by parties in the industrial world often take the form of criteria and standards that are measurable.

The valuing of standardised forms in the industrial world is examined closely by Thevenot (1984). He focuses on the creation of industrial instruments that are codified for the purposes of managing labour, for example, occupational codes and industrial awards. He argues that organisations may make investments in standard forms because in doing so, equivalences are more easily determined – for example, a person's job is described by a particular occupational code which is used to determine the rate of pay they should receive. Investment in standardised form, he argues, increases circulation as well as the lifespan of the form whereas localised forms have less investment value because they cannot be used to make comparisons across organisations. It is for these same reasons, that standardised forms may be

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resisted, or the extent of standardisation limited by those who feel that their existing 'above standard' conditions may be reduced to the lowest common denominator. The trajectory of localised forms becoming absorbed (with or without resistance) into standardised forms may be understood by understanding these objects as 'boundary objects'.

The concept of 'boundary object' was developed by Star and Griesemer (1989) When Star (2010) reflects on the concept later as it gets taken up, she explains that "[b]oundary objects are a sort of arrangement that allows different groups to work together without a consensus" (p. 602). The dynamics of this are as follows:

> The object (remember, to read this as a set of work arrangements that are at once material and processual) resides between social worlds (or communities of practice) where it is ill structured.

> When necessary, the object is worked on by local groups who maintain its vaguer identity as a common object, while making it more specific, more tailored to local use within a social world, and therefore useful for work that is NOT interdisciplinary.

> Groups that are cooperating without consensus tack back-and-forth between both forms of the object. (pp. 604–605)

Boundary objects can take different forms, and there are four different types identified by Star and Griesemer (1989), one of which is particularly relevant to our study: the 'standardised forms':

> These are boundary objects devised as methods of common communication across dispersed work groups … The advantages of such objects are that local uncertainties … are deleted. (p. 411)

When a collection of boundary objects that are circulating across intersecting communities are brought together to facilitate cooperative work at a larger scale, they become 'boundary infrastructures' that can form standards that have wider ranging consequences on local practices – creating equivalences across a wider set of domains and erasing the textures and particulars of local practices (Bowker & Star, 1999, p. 241).

But what are the mechanisms by which certain boundary objects come together and become standards, and others are left out and rendered "residual categories" (Star, 2010, p. 615)?

Making Equivalences Count

Science and Technology Studies (STS) offers us some valuable theoretical resources to follow the development of new technologies from a socio-cultural perspective, including symbolic technologies such as policies and 'forms'. We employ the theoretical resources of Actor Network Theory (ANT) developed by

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Latour (e.g. 1987), Callon (e.g. 1987), Law (e.g. 1987) and others to trace how a particular powerful discourse about literacy and numeracy has emerged, and other discourses have been rendered invisible in the national policy context in Australia. A central idea of ANT is that of 'translations' – the transformation of claims made by stakeholders into 'facts' in such a way that the 'facts' serve the interests of the actors that are going to be part of the project, for example of constructing policies and other symbolic artefacts (or indeed material artefacts). Through enrolling more actors into a network formed around compatible interests, the 'facts' that are constructed gain legitimacy and greater resistance to contestation from outside the network. ANT's ideas of 'centres of calculation' and 'inscription devices' are key concepts to guide our analysis of the means by which a particular and singular discourse of literacy and numeracy accumulated purchase power in Australia.

Prior to the emergence of ANT, STS scholars challenged earlier theses of technological determinism (that technology, once developed takes a life of its own) with social constructivist theses that theorised technology as a construction of society, created to respond to and reflect socio-cultural values and needs of the creators. Thus the determinists saw society being shaped by autonomous technologies, while the social constructivists saw technologies as being the product of social endeavours. ANT's significant contribution was the blurring of the distinction between humans and technology, and viewing them as mutually constitutive. Thus, ANT takes into account the determinists' view that technologies do in fact have both anticipated and unanticipated effects on society, while also recognising the range of cultural, economic and social conditions in which certain technologies (but not others) evolve at a particular time in a particular place under particular social conditions.

Employing ANT in educational research, and more specifically in adult literacy policy research is not an original contribution of this study. Hamilton (2011, 2012) and Hamilton and Pitt (2011), for example, employed ANT to examine the making of an adult literacy policy in the United Kingdom (UK). Given adult education policies in the UK and Australia share some similar histories of ideological shifts and tensions, sharing ANT as a central resource for investigation will necessarily yield similarities between Hamilton's studies and this study.

One of the key theoretical constructs in ANT is that of an 'inscription' which Latour (1999) defines in the following way:

> A general term that refers to all the types of transformations through which an entity becomes materialised into a sign, an archive, a document, a piece of paper, a trace. Usually but not always inscriptions are two-dimensional, superimposable, and combinable. They are always mobile, that is, they allow new translations and articulations while keeping some types of relations intact. Hence they are also called "immutable mobiles", a term that focuses on the movement of displacement and the contradictory requirements of the task. (pp. 306–308)

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A policy is an example of an inscription. Policies are documents that are applied in a number of relevant contexts, interpreted and translated into local and specific strategies, and articulated in practice – for example, education policies are articulated in teachers' classroom practices. Latour (1987) also introduces the notion of 'inscription devices', those instruments, which can be anything from a thermometer to a government statistical institution that produces the inscriptions. The inscriptions that are produced 'at a distance' through distinct means may be translated and combined at a centre for calculation, while operating as 'immutable mobiles' in the wider sphere.

Star and Griesemer (1989) also draw on ANT, and acknowledge that what they call 'standardised forms' are akin to what Latour calls 'immutable mobiles'. Crucial to the possibility of making calculations with a number of immutable mobiles is the assumption that some sort of conversion or transformation can be made between the different inscriptions. Thus the notion of 'equivalence' is critical for centres of calculation. Being able to draw equivalences, Latour (1987) argues, increases the mobility and combinability of the inscriptions. Inscriptions that undergo a number of translations become immutable mobiles – objects that carry with them some features that are immutable, while at the same time subject to articulation in different social worlds.

In this study we will examine how literacy and numeracy are iteratively re-represented into measurable forms that can then be combined and equated with other calculated entities to produce new equivalences. ANT leads us to examine these iterations of 'translating' literacy and numeracy interests as ways of expanding the network that the centres which are performing these calculations can influence and control, thus transforming disparate boundary objects into more robust boundary infrastructures.

CREATING POWERFUL STANDARDS (AND RESIDUAL
OBJECTS IN THE PROCESS)

We examine the creation of powerful standards in the lead up to the release of the NFSS by considering the activities of some key actors (humans and symbolic artefacts), and media activities and reports surrounding them. We will see how some of these actors become important boundary objects that circulate in and through certain social worlds to build a boundary infrastructure that strongly privileges an economic perspective of literacy.

The Adult Literacy and Life Skills Survey

We commence our 'archaeology' of the Strategy in 2006, the year when an international survey of adult literacy, the Adult Literacy and Lifeskills (ALL) survey was conducted in Australia. This survey was coordinated by the OECD and

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Statistics Canada and conducted in twelve countries. Our choice of excavating no further back than 2006 is partly a pragmatic one; nothing is completely ahistorical but there has to be reasonable limits to how far back we can go in one small study. But also, the representation of literacy and numeracy in the reporting of the ALL survey proved significant in the building of the Strategy; all representations of literacy and numeracy in the boundary objects that emerged since the ALL survey have a translation back to the release of the ALL survey results. In direct contrast to the findings of the first national adult literacy survey in Australia that there was *No Single Measure* of adult literacy (Wickert, 1989), the discourse that is now gaining increasing power is aimed to ensure that there is and must be a single measure to which all other measures of literacy and numeracy can be equated (Black & Yasukawa, 2014).

The ALL survey results for Australia were first released in 2007 (and re-released in 2008) by the Australian Bureau of Statistics (Australian Bureau of Statistics [ABS], 2008). The Media Release on 28 November, 2007 accompanying the results introduced the results by stating:

> There were fewer Australians with literacy assessed as being in the lowest category than there was a decade ago … The 2006 Adult Literacy and Life Skills Survey of Australians aged 15 to 74 years assessed prose literacy (e.g. ability to read newspapers), document literacy (e.g. ability to use bus schedules) as well as numeracy and problem solving skills, and the ability to understand health related information (e.g. first aid advice).

> Approximately 17 percent (2.5 million) of people were assessed at the lowest prose literacy level (down from 20 percent in 1996), while 18 percent (2.7 million) were assessed at the lowest document literacy level (down from 20 percent in 2006).

Comparisons between the ALL survey results and the earlier results for Australia in the 1996 International Adult Literacy Survey (IALS) is thus the first point of interest that the reader of this Media Release (ABS, 2007) is drawn to.[1] The rest of the one-page Media Release lists a selection of findings, including:

> Just over half (54 percent) of Australians aged 15 to 74 were assessed as having the prose literacy skills needed to meet the complex demands of everyday life and work. Results were similar for document literacy with 53 percent and numeracy with 47 percent achieving this level …

> Internationally, Australia was ranked in the middle across the different types of literacy with results closely aligned with those from Canada. (ABS, 2007)

Other findings that are listed make comparisons of literacy levels according to gender, employment status, income levels, educational qualification levels, and language backgrounds. There are many observations that can be made just from this Media Release. The first is that a mechanism for making statistical comparisons

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of prose and document literacy levels was already in place when the ALL survey results were released. In Star's (2010) terms, the IALS could be seen as a 'boundary infrastructure' that affords comparisons of levels to be made across time, as well as across countries and demographic groups.

Secondly, the Media Release suggests that equivalence relations exist between the ALL survey performance and people's ability "to meet the complex demands of everyday life and work". The ABS explains that level 3 is regarded by the survey developers as the "minimum required for individuals to meet the complex demands of everyday life and work in the emerging knowledge-based economy" (2008, p. 2). The ABS cites a Statistics Canada report for this equivalence between the ALL survey level 3 and the "minimum required", and as we shall see this translation of the ALL survey level 3 has been a significant boundary object in the history of the Strategy. One could legitimately ask how anyone could determine such a minimum, not to mention the contestability of what the complex demands are, and the definition of a 'knowledge-based economy' (see Black & Yasukawa, 2014 for an investigation into the obscure origins of the level 3). However, the equivalence between the level 3 and the "minimum required" appears to be an immutable mobile, or in Star and Griesemer's (1989) terms, a 'standardised form' of boundary object where local uncertainties about the actual meaning of the level 3 are deleted in the way it is used.

The release of the ALL survey results was promulgated with emotive media headlines. The day after the Media Release, a South Australian newspaper reported:

Half of Australians illiterate.

Survey shows many school leavers and adults struggle with basic tasks such as reading a map or bus timetable.

Almost half of Australian adults do not have the basic reading and writing skills needed for everyday living and have difficulty finding information in newspapers, using a bus timetable or understanding directions on medicine labels, a new report reveals … (Hiatt, 2007)

On the same day, another newspaper paper reported that:

We're the ninny state: Report says Victoria must boost adult literacy.

VICTORIA is in danger of becoming the dunce state, with half of our adults unable to read or count well enough to get through daily life.

Victoria only beats Tasmania in the adult literacy stakes, and ranks above the Northern Territory and Tasmania in numeracy.

Australian Bureau of Statistics results released yesterday show just over half of Australians had the literacy skills to meet the basic demands of everyday life and work. … (Metlikovec, 2007)

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Here we see a reference made to the level 3 as the minimum needed "to meet the basic demands of everyday life and work". Other papers responded on the same day, and we also see a league table being constructed by states and territories – the Australian Capital Territory (Canberra) at the top, and Tasmania at the bottom:

Tasmania bottom of the class. (Killick, 2007)

Canberra leads way in life and literacy. (Rudra, 2007)

Within a fortnight, in South Australia, examination of the state's performance lead to the media declaring a:

LITERACY CRISIS: Half of us lack basic life skills. Daily tasks a struggle, says study. (Novak, 2007)

The corpus of the media responses to the Media Release from the ABS suggests that a consensus is developing that it is a 'fact' that half of the Australian adult population are in deficit in relation to 'the minimum level of literacy and numeracy'. There are in fact two powerful 'facts' being constructed – that of a 'deficit' population, and that there is a 'minimum' level that can be measured and below which a person 'can't cope' with the demands of life and work.

The Australian Economy Needs an Education Revolution

Only a few days before the release of the ALL survey results, another arguably more significant event took place in Australia. After over a decade of a conservative government, The Australian Labor Party won government and Kevin Rudd assumed the Prime Ministership. Early in the election campaign, he and another Labour politician, Stephen Smith had released the policy position paper *The Australian economy needs an education revolution: New Directions Paper on the critical link between long term prosperity, productivity growth and human capital investment* (Rudd & Smith, 2007). This paper made a strong case for investment in education at all levels in order to secure its economic returns. This policy position paper, with its heavy human capital orientation, is another boundary object in the history of the Strategy to which many later developments can be traced back. Within a month of the release of the ALL survey, the media, and then later industry peak bodies began speculating about the impact of the ALL survey on the economy:

Basic skills deficit hampering growth.

AUSTRALIAN Bureau of Statistics (ABS) figures show literacy and numeracy skills crucial for business growth are inadequate. …

An OECD comparison of 14 countries estimated that a one percent increase in a nation's average adult literacy level led to a 2.5 percent increase in labour productivity and a 1.5 percent rise in GDP per capita. ("Basic skills deficit hampering growth", 2007)

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Thus a new equivalence is introduced that adds to the economic rationale for literacy: 1 percent increase in literacy level = 2.5 percent increase in productivity = 1.5 percent increase in GDP.

Others media reports followed, such as the one in January of the following year:

Half lack skills to live in "knowledge economy"

… 46 percent of the population, or seven million people, would struggle to understand the meaning of newspaper and magazine articles or documentation such as maps and payslips.

And 53 percent reached just the second of five levels in a practical numeracy test, while 70 percent, the equivalent of 10.6 million people, only managed to progress to level 2 in a series of problem-solving exercises. "Level 3 is regarded by the survey developers as the minimum required for individuals to meet the complex demands of everyday life and work in the emerging knowledge-based economy," said the ABS report, Adult Literacy and Life Skills. (Lunn, 2008)

We begin to see the ALL survey level 3 criterion representing 'the minimum' marrying well with the government's human capital agenda of the 'education revolution'.

More actors start to join the economic discourse of literacy. In February 2008 the Australian Broadcasting Corporation posted a report quoting Dave Tout, the spokesperson for the Australian Council for Adult Literacy, the peak professional body of adult literacy and numeracy practitioners:

We talk about skills shortages and having to upskill our workers, well if they don't have the core skills of literacy and numeracy then my argument would be, how can they undertake their training to improve their workplace skills?

So it carries implications for the workplace as well. (Roberts, 2008)

In the same news report, the then Deputy Prime Minister and Minister for Education, Julia Gillard is quoted as follows:

We understand that people who are of working age need to be literate and numerate for the rest of the training that they may receive to be meaningful, she said.

I mean I think we all intuitively know that if you can't read and write then learning other things is very difficult indeed.

That's why in designing these training packages we're making sure that we're focused on those people who are locked outside work now because they lack basic skills. (ibid.)

The 'education revolution' also starts to unfold in skills sectors. Within six months of winning government a new policy advisory organisation, Skills Australia was established by an Act of Government in 2008 with a mission to:

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provide independent and high quality advice to ensure the government's investment in education and training promotes the development of a highly skilled workforce, increases workforce participation (especially among less advantaged groups), meets the needs of industry and increases Australia's productivity. (Australian Workforce and Productivity Agency – http://www.awpa.gov.au/about-us/Pages/History.aspx)

Anticipating a New Strategy

The emergence of the representation of literacy as a resource for productivity and economic growth is accelerated when on 30 August, 2009, Heather Ridout, the Chief Executive Officer of the peak industry organisation, the Australian Industry Group (AIG) announced Federal Government funding awarded to an AIG project to examine the impact of 'low literacy and numeracy' on businesses, citing the previously referred equivalence relations in a media release:

The OECD has estimated that a one percent increase in a population's literacy skills will lead to a 2.5 percent increase in labour productivity and a 1.5 percent increase in per capita GDP. Considering that ABS data … has found that almost half of working Australians have less than the minimum literacy and numeracy levels required to meet the demands of everyday work, there is a huge potential to lift productivity. (AIG, 2009)

By the next day, a number of voices supporting the AIG project were heard in the media:

Australian Council of Trade Unions (ACTU) president Sharan Burrow welcomes the programme and says improving workplace safety is paramount.

Most professions rely on capacity to communicate, to make sure that work processes – particularly where there are dangerous goods or dangerous equipment – that those communication processes are absolutely clear.

But beyond safety, it is also an issue of opportunity, capacity to anticipate and productivity really for the employers themselves, so all round literacy is a key issue. (Herbert, 2009)

By March 2010, the AIG was supported by Skills Australia which launched *Australian Workforce Futures: A National Workforce Development Strategy*. This report made an explicit recommendation for the development of "a national adult literacy and numeracy strategy" (Skills Australia, 2010, p. 41) as one of its 12 recommendations. Although the recommendation is elaborated in ways that suggests broader benefits than just economic returns, the first point made is to "reframe language, literacy and numeracy as central to participation and productivity" (p. 41).

A clear government endorsement of the recommendation is made public when on 10 May, 2010, the Federal Treasurer in his Budget speech said:

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… I announce tonight a new Skills for Sustainable Growth strategy.

A strategy that will invest $661 million in the skills of our workforce and ensure our education and training systems are flexible and responsive to our economic needs. …

It will improve the quality and accessibility of training – strengthening the link between training and business needs.

And it will provide greater access to training in core foundation skills such as literacy and numeracy.

Mr Speaker, infrastructure investment is a key driver of productivity.

(http://www.budget.gov.au/2010-11/content/speech/html/speech.htm)

The 2010–2011 budget allocated an extra $100 million over four years for a 'Foundation Skills' package of initiatives including a significant expansion for job seeker and workplace programmes, and a commitment that:

The Government will also develop a National Strategy for Foundation Skills in consultation with the States and Territories by the end of 2011. The National Strategy will provide a framework for foundation skills provision across all jurisdictions for the next decade. (http://www.budget.gov.au/2010-11/content/bp2/html/bp2_expense-08.htm)

To advance the development of the Strategy, the National Centre for Vocational Education Research (NCVER) hosted a conference in September, 2010 to explore what the Strategy should focus on, bringing a number of stakeholders including representatives from the practitioner peak bodies, educational economists, government representatives and specialist consultants together (NCVER, 2011). Listed in the main points emerging from the conference was:

Measure success.

What we are measuring and how we are measuring it are important considerations.

The longer-term outcomes of language, literacy and numeracy programs, from both a workplace and individual perspective, also need to be investigated. Having both pre- and post-assessment would assist in determining longer-term outcomes from programs.

Greater awareness of the applicability and utility of the Australian Core Skills Framework is required to enable wider use of it. This is particularly important for teachers and service providers. (Note that NCVER is currently conducting a mapping exercise between the Australian Core Skills Framework and ALL survey.) (NCVER, 2011, pp. 43–44)

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Here we see reference made to the Australian Core Skills Framework (ACSF), a 'standardised form' of assessment in the adult literacy and numeracy field in Australia. It is described as a framework which "provides a rich, detailed picture of real life performance in the five core skills of learning, reading, writing, oral communication and numeracy" (Department of Industry, Innovation, Science, Research and Tertiary Education, 2012, p. 2) and is a compulsory instrument for assessment and reporting learner outcomes in Commonwealth funded job seeker and workplace literacy and numeracy programmes. The ACSF manual says that it:

> has been developed to facilitate a consistent national approach to the identification and development of the core skills in the diverse personal, community, work, and education and training contexts. It offers:
>
> Shared concepts and language for identifying, describing and discussing core skills.
>
> A systematic approach to benchmarking, monitoring and reporting on core skills performance. (Department of Industry, Innovation, Science, Research and Tertiary Education [DIIRSRTE], 2012, p. 2)

Thus the reporting of the NCVER conference outcomes foreshadows the creation of an equivalence relation between the ACSF, which measures, monitors and reports on individuals performance in the 'core skills', and the ALL survey which measured the performance of different populations in similar skill areas. This leads to an initiative to further standardise the form of the ACSF so that it is more widely applicable, to the extent of making it comparable with the OECD population survey levels. This had, in fact, already been anticipated nearly two years prior, in an Agreement by the Council of Australian Governments (COAG) which specified that the proportion of the working-age population with literacy and numeracy levels at ALL survey levels 1, 2 and 3 be monitored (COAG, 2008).

Although the ACSF claims to be a tool for supporting development not only in work, but also education and training contexts, its significance in the human capital discourse of literacy and numeracy becomes increasingly evident. In August, 2010, a researcher in the Productivity Commission, a research and policy advisory body of the Australian Government, released the report *Links Between Literacy and Numeracy Skills and Labour Market Outcomes* which used econometric models with the ALL survey results:

> to formally estimate the effect of functional literacy and numeracy skills on labour force participation and on hourly wages (which is an indicator of productivity). (Shomos, 2010, p. 67)

Key findings from the study included:

> Results confirm previous research in the human capital literature – that improving literacy and numeracy skills has a positive, statistically significant effect on labour market outcomes.

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More specifically, it was estimated that an improvement in literacy and numeracy skills from level 1 to level 3 would:

• increase the likelihood of labour force participation by about 15 percentage points for women and about five percentage points for men
• increase hourly wage rates by about 25 and 30 percent for women and men respectively. (Shomos, 2010, p. viii)

This was followed in early 2011 with the release of the *National Foundation Skills for Adults Consultation* paper (Foundation Skills Working Group, 2011). The proposed definition of foundation skills: "language, literacy, numeracy and employability skills in the information age" (p. 4) confirms the positioning of the Strategy in the human capital discourse of the 'education revolution': this is primarily about literacy and numeracy for producing an economically productive workforce.

The Strategy as a human capital agenda is further strengthened on 4 April, 2011 when the 11 Industry Skills Councils (ISCs) jointly published the report *No More Excuses*: *An industry response to the language, literacy and numeracy challenge* (ISC, 2011). They make a call for action within the vocational education and training system, and for the COAG to establish a blueprint for action. This is supported later in the year by Skills Australia (2011) in their report *Skills for Prosperity*. A year earlier Skills Australia Chief Executive Robin Shreeve, had said in relation to foundation skills, "the most important first step is getting all the key players "singing off the same hymn sheet" ("Literacy and numeracy are holding Australia back", 2010), and by mid 2011, Government, policy makers, economists and industry representatives were doing just that. In Latour's (1987) terms, a 'centre of calculation' has been built linking the Government and its policy advisors and industry representatives, all ready to produce inscription devices that would help measure and calculate the productivity benefits of literacy and numeracy.

The Release of the Strategy

Before the Strategy was even released, much of what the Strategy would call for had been implemented. In early 2012, a new ACSF was released, and the project was well underway to map the ACSF levels against the ALL survey levels (Circelli, Gillis, Dulhunty, Wu, & Calvitto, 2013). A number of foundation skills 'products' that had earlier been anticipated in a paper entitled *Foundation Skills in VET Products for the 21st Century* (National Quality Council, 2010), such as a new training package for foundation skills delivery and clarification of the relationship between employability skills and foundation skills were under development before the Strategy was released. Thus when the Strategy was finally released on 28 September, 2012, there were few surprises, no announcements of additional funding, and little that was picked up by the media. The Strategy could be seen by many in the field as a summary of all of the initiatives that were already in place.

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In January, 2013, the report of the project to map the levels of the ACSF and the ALL survey was published as *Does 1 = 1? Mapping measures of adult literacy and numeracy* (Circelli et al., 2013). The report states:

So, does 1 = 1? This study has shown there to be a close alignment in the complexity of Level 1 reading and numeracy constructs between the Adult Literacy and Life Skills survey and the Australian Core Skills Framework. However, the alignment between each performance level across the two frameworks was not as direct for higher skill levels. For example, as we have seen, for the reading construct, ACSF exit Level 3 appeared to be more similar to ALLS Level 2 than ALLS Level 3, and ACSF exit Level 4 was more closely aligned to ALLS reading Level 3.

… as the results are suggesting, ALLS Level 3 in reading and numeracy is approximately equivalent to ACSF exit Level 4, then adult literacy and numeracy programmes that are delivered and reported against the ACSF may need to specify ACSF exit Level 4 as the desired outcome if the implied workforce skills development objective is to be met. (p. 14)

From this project, there are now equivalences between the ALL survey levels and the ACSF, and the ALL survey level 3 that played a large role in marrying literacy and numeracy with the productivity agenda can be substituted by the level 4 of the ACSF, the widely used assessment and reporting framework in Australia.

Has the centre of calculation finished its work? The mapping report suggests otherwise:

The results from this study could be used to map other similar frameworks or programmes onto the Australian Core Skills Framework and/or the Adult Literacy and Life Skills survey. For example, the Adult Migrant English Program (AMEP), if considered to have similar constructs in terms of reading/numeracy, could also be mapped onto the Reading and/or Numeracy complexity scales developed in this particular study.

Similarly, the new, yet to be released Core Skills for Work Framework (CSFW; ITHACA Group, 2012), which has been designed to have five developmental levels across ten skill areas (to complement the ACSF), could also be empirically validated using a similar methodology to that employed in the current study … In addition to empirically validating the framework in terms of its architectural structure etc., it may also be desirable to map certain skills sets within its framework to the ACSF. (Circelli et al., 2013, p. 16)

There is more that will keep the centre of calculations busy for another little while. Less than six months after the release of the NFSS, the preliminary results of the most recent OECD survey Programme of International Assessment of Adult Competencies (PIAAC) was released, and immediately, the Australian Council for

Educational Research (ACER) issued a media release, quoting a senior research fellow of the Centre, David Tout:

> The preliminary PIAAC results from 2011–12 show that about 7.3 million or 44 percent of adult Australians achieved in the lowest two bands for literacy, while about 8.9 million or 55 percent achieved in the lowest two bands for numeracy.
>
> Of significance for employers and those in the VET sector, PIAAC also shows that 38 percent of employed adults achieved in the lowest two bands for literacy, while 48 percent achieved in the lowest two bands for numeracy.
>
> "This is an *alarming result* for a country that needs to lift the skill levels of its population to ensure a healthy society and a robust economy," Mr Tout said. (ACER, 2013, emphasis added)

REFLECTIONS ON THE EXCAVATIONS

The national Strategy is a product of the cooperation of a number of different actors both inside and outside the Australian adult literacy and numeracy industry. Indeed it is when cooperation started to extend to other industries and internationally that the work flourished and established a powerful centre of calculation. The centre calculated equivalences that enable an individual's literacy and numeracy levels to be interpreted in relation to the literacy levels of populations in OECD countries. The impetus for such calculations could be found in the productivity driven agenda of the Government's 'education revolution'. Similar impetus could be found in policy work in other OECD countries such as Canada (Employment and Social Skills Canada, 2013) and the United Kingdom (see for example discussion in Wolf & Evans, 2010), hardly surprising with the globalisation of the economic system. As Walker (2009) argues, OECD policies on lifelong learning, while espousing a rhetoric about social inclusion are biased towards education that creates "worthy citizens" who are employable, productive and wealthy (p. 348).

One observation that can be made from retracing the evolution of the Strategy using the theoretical resources from ANT is the amount of 'investment in forms' that was made. These are the kinds of forms that Star and Griesemer (1989) call 'standardised forms' that are designed to eliminate local uncertainties. Even prior to the development of the Strategy, instruments such as the ACSF had been critical boundary objects between the practitioners, providers and government to report on and monitor learners and workers' performance in literacy and numeracy. Referring back to the one national framework of levels of performance, the ACSF provided a communication tool between these different communities of practice. But projects like the "Does 1=1?" (Circelli et al., 2013) extend the circulation of the ACSF to the OECD by providing a mechanism for equating the different levels of the ALL survey

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to the ACSF, making it easier to monitor the performance of learners in relation to OECD averages.

What is this all about? What kind of a world are we living in? The actors circulating in and out of the centre of calculation which produced the Strategy exist in what Boltanski and Thevenot (1999) characterise as the industrial world, where the mode of evaluating worth is in terms of productivity and efficiency and where relevant information for evaluating is statistical. When literacy and numeracy are captured as prominent actors in the industrial world, those who see literacy and numeracy in other social worlds, for example the civic, domestic or inspired worlds – if we are to use Boltanksi's and Thevenot's (1999) categories, are using different 'regimes of justification' to discuss the value of literacy and numeracy. Such actors, and we include ourselves among them, may be valuing literacy and numeracy for the purposes of some collective interest in the community, or serving a role in life within the learner's family, or expressing one's creativity.

Literacy and numeracy do exist in different social worlds – and this is precisely what NLS research reveals: there are multiple literacies and numeracies that mean and are valued differently in different social contexts. But the industrial world has made strong investments in constructing standardised forms to enable the measurement and monitoring of the literacy and numeracy learning and productivity. There, a pluralist notion of literacy and numeracy is outside the regime of justification. It is not possible to even have a dispute about what 'counts' as literacy and numeracy unless it is framed in terms of productivity. This accounts for the alienation that we experience, as stakeholders in the field of adult literacy and numeracy, along with other researchers who view literacy and numeracy from a social practice perspective.

Many who consider themselves 'in the field of literacy and numeracy' – practitioners, researchers, as well as policy makers and industry representatives – held high optimism when discussions about a new Strategy commenced. The authors too expressed our optimism in our contribution to the NCVER Search conference (Black & Yasukawa, 2011) and in earlier discussions of 'foundation skills' (Black & Yasukawa, 2010). But the Strategy that emerged was a Strategy firmly located in only one social world, away from some of the other possible worlds where literacy and numeracy practices also exist. A Strategy is more easily evaluated within this one 'industrial' mode of evaluation, against one clear set of goals rather than within multiple modes of evaluation for multiple goals. And such a Strategy carries authority because it has roots in a very powerful centre of calculation that includes transnational organisations such as the OECD.

This chapter has provided an elucidation of why it is difficult to imagine how literacy and numeracy that exist in other social worlds can win a 'dispute' or even enter a debate with those who engineer literacy and numeracy in the industrial world. Such an analysis is not particularly empowering because it provides neither a way for alternative understandings of literacy and numeracy to co-exist as different but legitimate perspectives in the current policy space, nor a way for these alternative understandings to be strengthened in the absence of any policy support. These are

larger questions that we are not able to provide solutions to; however, we do believe that even if practitioners and researchers have to work with the current National Strategy and its implications for practice, it is important to know where this Strategy came from and what it was designed to achieve. Blindness to the political agenda of policy only strengthens the centre of calculation.

NOTE

[1] The summary report of the results (ABS, 2007) qualifies that the numeracy levels cannot be compared with the quantitative literacy levels of the 1996 IALS because numeracy was defined more broadly in the ALL survey than in the IALS.

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3. WHAT TO LOOK FOR IN PIAAC RESULTS

How to Read Reports from International Surveys

INTRODUCTION

In October 2013, results from the Organisation for Economic Co-operation and Development (OECD) sponsored Programme for the International Assessment of Adult Competencies (PIAAC) for 24 participating countries (mostly in Europe, but also including North America, the Far East, and Australia) became available. As the successor to the International Adult Literacy Survey (IALS) in the 1990s and the Adult Literacy and Lifeskills (ALL) survey in the 2000s, PIAAC aims to provide information as an international comparative survey. It also has many similarities with national studies, such as Skills for Life in the United Kingdom (UK). Unlike international school level surveys (e.g. Programme for International Student Assessment [PISA], Trends in International Mathematics and Science Study [TIMSS][1]), which gain access to 'captive populations' in schools, PIAAC has needed to use a combination of household survey and educational testing methodologies. It represents a development from the earlier studies, in several ways:

- its first round covers a greater number of countries (24, two thirds of which are European Union (EU) members) – though probably all could be called 'advanced industrial societies'
- it focuses on three domains or 'competencies' – Literacy, Numeracy, and now Problem-solving in technologically rich environments (PSTRE)
- it uses computer administration, which, amongst other things, allows 'adaptive routing', aiming to assess the broad 'skill level' of the respondent from a few initial responses, and then to administer more appropriate items (in terms of difficulty) throughout the interview
- it implements a number of methodological and fieldwork improvements, for example, specification and regulation of sampling and fieldwork standards, and
- it has made its data available more quickly and more conveniently.

In addition, PIAAC is designed to be repeated, in order to build up time series data for participating countries. This 'longitudinal' feature would aim to increase the possibility of evaluating competing causal explanations using the study over time of correlations of the outcomes with relevant social or attitudinal variables.

In this chapter, I focus on how to understand these studies, by considering conceptual issues, methodological aspects (research design and execution), and presentation of results. I also discuss the types of results from Australia made available in October 2013, as well as preliminary results released by the Australian Bureau of Statistics (ABS) earlier in that year (ABS, 2013a, 2013b). The chapter aims to air questions concerning the relevance of these survey results to literacy and numeracy researchers and practitioners, and the types of further research possibly needed, in different national and local contexts.

POLICY CONTEXT

Educational policy is currently being developed on a world-wide scale, with supra-national organisations being key agencies for change (Rizvi & Lingard, 2010). In this context, the idea of Lifelong Learning (LLL) is central to the conceptualisation and development of adult literacy and adult numeracy. In international policy debates, LLL has been much contested, e.g. between 'humanistic' and 'economistic' approaches (Evans, Wedege, & Yasukawa, 2013). In this connection, it is important to consider work done both within the UNESCO programmes (e.g. Guadalupe, 2015), and by the OECD.

Here I focus on the OECD, the sponsor of PIAAC. OECD's view of LLL aims to promote several objectives:

- development of knowledge and competencies enabling each citizen to actively participate in various spheres of globalised social and economic life
- a broad view of learning, to include more than just the acquisition of technical skills for the economy (OECD, 2007, pp. 9–10)
- emphasis on the citizen's need to acquire *and update* a range of abilities, attitudes, knowledge and qualifications over the life-course, and hence the individual learner's responsibility for their own education (e.g. Walker, 2009)
- change in the focus of learning 'from what people know' to 'what they can do' (Moore & Jones, 2007), and
- weakening of the distinction between formal and informal education (Young, 2010).

Some of the consequences of these positions will be discussed below (see also Tsatsaroni & Evans, 2013).

The European Union (EU) is working closely with the OECD on PIAAC. Increasing globalisation and competitive economic environments are leading national governments to seek competitive advantage, "frequently defined in terms of the quality of national education and training systems judged according to international standards" (Brown, Halsey, Lauder, & Wells, 1997, pp. 7–8). Results from surveys like PIAAC (and PISA) may provide relevant international yardsticks.

For supra-national institutions like the EU, the area of LLL provides a domain where they can make a legitimate policy intervention, since, in a 'globalised' world,

a focus on labour mobility makes LLL a supra-national concern. This provides a basis for OECD's and EU's actions, leading to the promotion of the 'skills and competencies agenda', in all sectors of education and training (Grek, 2010). More generally, the OECD and the EU are disseminating ideas and practices that strongly influence national policy making around the world. These include:

• the promotion of expertise in creating comparable datasets, so that countries can measure the *relative* success of their education systems and shift policy orientations accordingly
• new forms of 'soft governance' of national educational systems, encompassing the production and dissemination of knowledge, and of comparative data such as educational and social indicators, and peer reviews involving country and thematic reviews – so that these supra-national organisations are 'governing by data' (Ozga, 2009).

Thus, one of the effects of international studies like PISA and PIAAC is to contribute to a 'comparative turn' in educational policy-making and to a "scientific approach" to political decision-making (Grek, 2010, p. 398).

THE PIAAC SURVEY

PIAAC's wider objectives were presented by Andreas Schleicher (2008) of the Education Directorate at OECD – as helping the participating countries to:

• *Identify and measure differences* between individuals and across countries in key "competencies"
• *Relate measures of skills* based on these competencies to a range of *economic and social outcomes* relevant to participating countries, including *individual outcomes* such as labour market participation and earnings, or participation in further learning and education, and *aggregate outcomes* such as economic growth, or increasing social equity in the labour market
• *Assess the performance of education and training systems*, and clarify which policy measures might lead to enhancing competencies through the formal educational system – or in the work-place, through incentives addressed at the general population, etc. and
• *Clarify relevant "policy levers"* (pp. 2–3, emphasis added).

The PIAAC objectives thus appear to comprise a 'human capital' approach, linked with social concerns (Evans et al., 2013).

In the framework used by OECD, Literacy, Numeracy and Problem-solving in technology-rich environments[2] are the three 'competencies' which PIAAC aims to measure. In the OECD's approach, *competencies* are:

internal mental structures, i.e. abilities, capacities or dispositions embedded in the individual […] Although cognitive skills and the knowledge base are

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critical elements, it is important not to restrict attention to these components of a competence, but to include other aspects such as motivation and value orientation. (PIAAC Numeracy Expert Group, 2009, p. 10)[3]

Literacy is defined in PIAAC as:

understanding, evaluating, using and engaging with written texts to participate in society, to achieve one's goals, and to develop one's knowledge and potential. (OECD, 2013b, p. 21)

Numeracy is defined for the purposes of designing the items for PIAAC as:

the ability to access, use, interpret, and communicate mathematical information and ideas, in order to engage in and manage the mathematical demands of a range of situations in adult life. (OECD, 2013b, p. 26)

This is put forward as a basis for conceptualising mathematical thinking in context. However, in order to *operationalise* numeracy, the idea of *numerate behaviour* is developed, that is:

the way a person's numeracy is manifested in the face of situations or contexts which have mathematical elements or carry information of a quantitative nature. […] inferences about a person's numeracy are possible through analysis of performance on assessment tasks designed to elicit numerate behaviour. (PIAAC Numeracy Expert Group, 2009, p. 10)

This led to specifying the following dimensions of "numerate behaviour" (or 'task characteristics') that can be used to guide the construction of assessment tasks:

- *context* (four types): personal, work-related, society and community, education and training
- *cognitive strategy* or *response* (three main types): identify/locate/access (information); act on/use; interpret/evaluate
- *mathematical content* (four main types): quantity and number, dimension and shape, pattern and relationships, data and chance, and
- *representations* (of mathematical/statistical information): e.g. text, tables, graphs.[4]

Each Numeracy item can be categorised on these four dimensions, along with its estimated difficulty ('ability level'); see (OECD, 2013a, pp. 26–28).

PIAAC also aims to produce affective and other contextual data that can be related to the respondent's performance. This includes demographic and attitudinal information in a Background Questionnaire (BQ), and self-report indicators on the respondent's use of, and need for, job-related skills at work.[5]

Each country has interviewed at least 5,000 adults, normally 16–65 years of age. PIAAC's default method of survey administration is by laptop computer,[6] although paper-based testing was used in IALS/ALL (and PISA up to now). As indicated above, this facilitates the use of *adaptive routing*.

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Understanding PIAAC's Conceptual Framework and Methodology

In seeking to understand PIAAC and other adult skills surveys and their results, I consider how the interpretation of such studies needs to be related to their conceptual bases and methodological choices, as well as to arguments and decisions about presenting, reporting and reconceptualising them (e.g. Hamilton & Barton, 2000; Radical Statistics Education Group, 1982; Tsatsaroni & Evans, 2013).

Generally, surveys rely on aspects of the research design, responding to reasonably well-understood criteria of validity, to enhance and to monitor the measurement and sampling procedures. It is important for literacy and numeracy researchers, teachers and policy makers to be able to consider these when the results of a survey are presented and discussed. Here I consider the following likely effects of certain design features of the survey, and their realisation in the field:

- the *content validity* of the definitions of literacy, or of numeracy and numerate behaviour ('types' or categories of items, as above)
- the *measurement validity* of the items presented, including the administration and scoring procedures ('qualities' of items)
- the *reliability* of the measurement procedures, and
- the *external validity*, or representativeness, for the national population of interest, of the results produced from the sample (see Evans, 1983, for a fuller discussion).

In my discussion below, I will be referring to PIAAC Numeracy to explain these issues, but the same principles apply for Literacy.

Content Validity

Content validity refers to the extent to which a measure represents all aspects of a given concept. The definition of numeracy used by PIAAC (and, earlier, ALL) is based on the four dimensions of numerate behaviour stipulated above: *context, content, response, representation*. Each item can be categorised on these four dimensions, and the proportion of items falling into each category can be controlled over the whole set of items, so as to make the operational definition of numerate behaviour more explicit, and the content validity of the overall set of items more open to scrutiny. In PIAAC Numeracy, the proportion of items falling into each category of mathematical content, context, and response is controlled (OECD, 2013b, p. 28). This allows test designers to stipulate the proportions of the items that are from each type of each key dimension, and from different levels of difficulty[7] – for example, the proportion of 'data and chance' items of moderate difficulty.

Nevertheless, in an international survey, this provides a transnational definition, and one needs to question how well it 'fits' the lives of adults in any particular country. Indeed, the four types of *context* (Personal, Work-related, Society and community, Education and training) are *under-specified*: they are rather too general

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to refer to any actual specific social practice or social context in which *any particular respondent* might engage, in everyday life.

Measurement Validity

What I call here 'measurement validity' refers to the extent to which the responses to the set of items administered to a respondent actually capture what the conceptualisation of numeracy specifies; this will depend on the *actual range of items used*. As with most large-scale educational assessments, the full set of the items used is not made public while the survey is on-going.[8]

Nevertheless, careful reading of the OECD publications allows us some insights into the Numeracy items used. All 56 actual numeracy items are categorised as to Content, Cognitive strategy and Context in the Numeracy Item Map (OECD 2013b, p. 66, Table 4.3). Five of these items, one from each of the levels from 'below level 1' to level 4, are described in more detail (OECD 2013a, pp. 77–78). And three numeracy 'sample items', not used in PIAAC but similar to items actually used, are published in OECD (2013b, pp. 28–30).

The latter sample of three 'PIAAC-like' items was published to represent the more than 50 that might potentially be presented to any PIAAC respondent. Like any sample, of course, these three items cannot represent the full range of combinations of Content, Context, Cognitive strategy, and Difficulty levels. Nevertheless, it may be useful to consider them briefly here, since they give some specificity to the more general characterisation of numeracy in the survey discussed above. For one of the items, the mathematical content is framed by Personal or Work-related contexts; for the other two, Society and community contexts[9]. They combine realistic images of the problem at hand and school-like test rubrics, providing the questions that need to be answered, presumably by applying the correct mathematical procedures; see OECD (2013b, pp. 28–30).

In any particular country, we can ask how well these sorts of tasks – such as making precise readings from the appropriate temperature scale (as in item 2), or detecting changes in a time series graph of live births (as in item 1) – might represent adults' social practices and everyday lives in that country. We should also ask whether tasks such as these would tap or encourage what we would consider as mathematical thinking about potentially challenging tasks. Sample item 3, which asks for a calculation of the number of wind turbines needed to replace the output of one decommissioned nuclear power station in Sweden certainly appears to represent a more challenging task for most adults in many of the countries surveyed by PIAAC in the current round.

Measurement validity also requires procedures designed for the administration of the survey to be standardised in advance across all countries, e.g. design specifications of the laptops and software to be used, and rules for access to calculators and other aids[10]. As with any survey, full appreciation of the validity of procedures requires

assurance of how these procedures are followed in the field. This is even more crucial when results are compared across countries using different fieldwork teams.

External Validity

External validity includes the question of the representativeness of the sample for the population of interest; thus, the 5,000 or more adults (usually aged 16–65) selected for the sample in each country need to represent the population of that country. We can scrutinise, for any participating country, the sample design and other key aspects, such as the incentives offered to those selected for the sample to encourage their participation in the survey. Again, judgments about the effectiveness of these procedures depend partly on knowledge of the actual field practices.

However, it is important to realise that any result from such a sample, whether the mean score for a country, or a difference (e.g. by gender) in the percentages of items correct, is only an *estimate for the corresponding population value* **(**of the mean or the size of the difference in percentages). The population value for the whole country is what we would really like to know about – but this is not possible with certainty, since we only 'know' about the (hopefully 'representative') sample that our methods have chosen. Other samples, chosen in an equally 'correct' way, would (almost certainly) give different results. So virtually every numerical result that we produce with a sample survey cannot be considered *exact*, but should have a 'tolerance', *a margin of error*, on either side of the sample-based estimate. In this way we can be reasonably 'confident' that the population value (though its exact value is unknown) will be within a specified interval.[11]

Thus, if we consider Australia's average score in Numeracy, it is estimated as 268 points (267.6 to one decimal place), based on results (OECD, 2013a, p. 263, Table 2.6a) from a sample of 7,428 adults (OECD 2013b, p. 54). But this estimate of the average score of the entire population of adults 15–74 (about 16 million – see next section) cannot be exact (see above). Thus, a 95 percent confidence interval for the population average for Numeracy in Australia will be between 266 and 270 points.[12]

Sometimes, this use of confidence intervals leads to 'surprises'! For example, in the ranking by average Numeracy score, the first four countries are (to one decimal place):

Japan 288.2   Finland 282.2   Belgium 280.4   Netherlands 280.3

This appears to be a very neat ranking, except that Belgium and Netherlands are just about equal. However, if we produce 95 percent confidence intervals for each country's score, in order to be reasonably confident that we have allowed for sampling variation, we get the following intervals for each score (rounded to nearest scale-point):

Japan 287 to 290   Finland 281 to 284   Belgium and Netherlands 279 to 282

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Thus we can see that while Japan is still clearly 'ahead', the estimates for Finland, Belgium and Netherlands cannot be clearly separated, since their confidence intervals overlap: our neat ranking of countries looks much less clear-cut when we allow for sampling variation! Therefore, the OECD publishes analyses that allow for sampling variation.[13]

Reliability

The comparability of test administration across countries and across interviewers, and especially assuring the use of the same standards and practices in marking, has been a problem with past international surveys. Computer presentation and marking of test items will help greatly with *reliability*, the assurance that the survey will produce the same or very close results, if it were to be repeated, using the same procedures. But it may tend to undermine *content validity*, if it reduces the range of types of question that can be asked; for example, it is difficult to produce an item that asks a respondent to *give reasons for his/her answer*, if the item is to be presented and marked by computer. This trade-off between content/measurement validity and reliability is a well-known dilemma in research design.

Further, the strengthening of reliability may lead to concerns about loss of another aspect of *external validity*, namely *ecological validity*, i.e. whether the setting of the research is representative of those to which one wishes to generalise the results. For example, the on-screen presentation of tasks may not be representative of the settings in which respondents normally carry out tasks involving numeracy, and so may not facilitate their 'typical' thinking and behaviour responses. Again, similar dilemmas arise for much educational assessment – but must be considered afresh in understanding PIAAC results.

Beyond Methodology

This discussion of issues related to various aspects of the validity of the survey shows the importance of sound research design – and also of the way field work is accomplished. However, a number of key issues in interpreting the uses and effects of the survey go beyond the technical issues around methodological validity (e.g. Radical Statistics Education Group, 1982). They include the way that the survey's measured scores are *interpreted/reconceptualised* in presentations and reports of various interested parties. This aspect is of course not under the complete control of the survey's sponsors: for example, the media and certain national interests have often offered conflicting interpretations ('spin') of results of international surveys. Understanding these processes requires an appreciation of the policy context and the ideological debates that surround the reception of results in a particular country, as well as of the global education policy discourse.

Several examples can be given of the need for care and scepticism about the reporting and interpretation of these results; see e.g. *European Educational Research*

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Journal (2012), on the way that PISA results are reported and used, and in particular, Carvalho on the "plasticity of knowledge" (2012, pp. 180–183). One problem is that an adult's performance on one of the subtests such as Numeracy cannot simply be expressed as the 'proportion correct' – since adaptive routing means that some respondents were presented with 'harder' items, and some 'easier'. So Item Response Modelling is used to ('psychometrically') estimate a standardised score – for PIAAC, scores are estimated in the range zero to 500, with standard deviation 50. Then, the numerical score is commonly related to one of five general 'levels' of Literacy or Numeracy to make it meaningful.

Now, this may well be more informative than simply reporting the percentage of adults in a country that are categorised as 'literate' or not, as was the case before OECD (and other) international or national surveys. But as in all such surveys, there is debate about use of a simple and *one-dimensional* characterisation of an adult's Numeracy or Literacy. For example, Gillespie (2004) referring to the first UK Skills for Life survey (done using a similar methodology to PIAAC) notes: "The findings confirm that for many, being 'at a given level' is not meaningful for the individual, as levels embody predetermined assumptions about progression and relative difficulty" (p. 1). Part of this scepticism flows from the finding that many adults have different 'spiky profiles', due to distinctive life experiences (Gillespie, 2004, pp. 4–6). Thus, some adults may find items of type A Content (say, 'data and chance') more difficult than type B items (e.g. 'dimension and shape') – and others find the opposite.

Similarly, some policy-makers may attempt to stipulate 'the minimum level of numeracy (or literacy) needed to cope with the demands of adult life' in their particular country – but this notion too is questionable; see Black and Yasukawa's (2014) discussion of current debates in Australia. Such generalising claims group together adults with different work, family and social situations, and different literacy or numeracy 'demands' on them.

These sorts of concerns about validity and interpretation are shared by users of all surveys including assessments, especially those that aim to make comparisons across countries, or over time. Nevertheless, such questions must be assessed for any survey, where results aim to inform policy or practice.

SOME FURTHER RESULTS FOR PIAAC FROM AUSTRALIA

A preliminary summary of the methodology and results from Australia was made available in February 2013, by the contractor, the Australian Bureau of Statistics (ABS, 2013a). This provided an indication of the sorts of results that became available in each of the participating countries from October 2013. Here I give three examples.

Figure 1 shows the proportions of Australian adults at different skills levels. Approximately 7.3 million (44 percent) Australians aged 15 to 74 years had Literacy skills at Levels 1[14] and 2, a further 6.4 million (39 percent) at Level 3 and 2.7 million (17 percent) at Levels 4/5. For the Numeracy scale, approximately 8.9 million
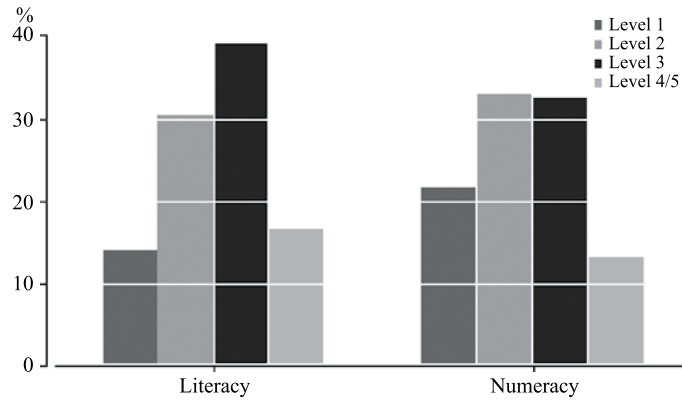
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Figure 1. Overall results from PIAAC for Literacy and Numeracy: Australia, 2013.
Source: Australian Bureau of Statistics (2013a)

(55 percent) Australians were assessed at Levels 1 and 2, 5.3 million (32 percent) at Level 3 and 2.1 million (13 percent) at Level 4/5. One could also compare Literacy and Numeracy levels for subgroups, e.g. residents of different Australian states. Thus, for Numeracy, Australian Capital Territory recorded the highest proportion of adults at Level 4/5 (23 percent). One can also ask about gender differences, frequently of interest in research like this; see Figures 2a and 2b.
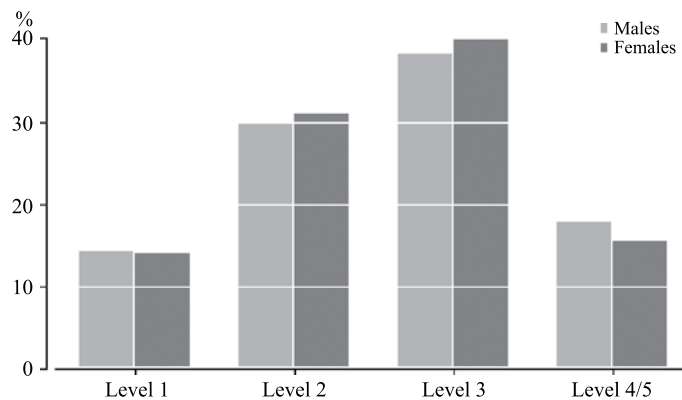
Figure 2a. Proportion at each PIAAC Literacy level, by sex: Australia 2013.
Source: ABS (2013a)

In Figure 2a, there appears to be little difference in the proportion of males and females at each level of the Literacy scale. However, when we consider Numeracy results in Figure 2b we see that a higher proportion of males (17 percent) attained

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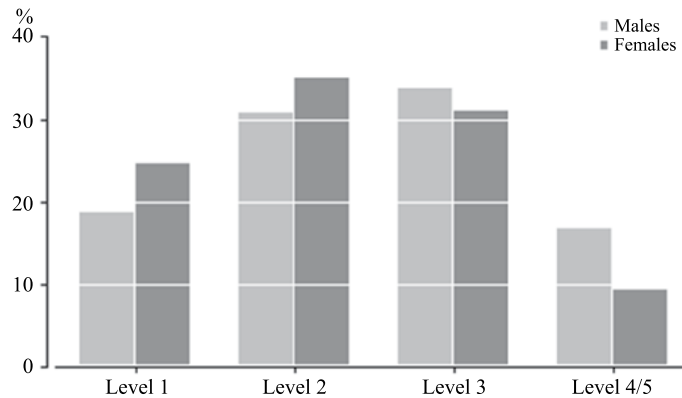
Figure 2b. Proportion at each PIAAC Numeracy level, by sex: Australia 2013.
Source: ABS (2013a)

scores at Levels 4/5 compared with females (9 percent); the difference in those attaining Level 3 or above, about 50 percent of males compared with 42 percent of women, appears less striking, but still noteworthy.

One of the concerns of policy-makers is that younger generations should exhibit a higher level of skills than older people; otherwise there are anxieties about a national 'decline in skills', and loss of competitiveness over time. Hence, there has been much interest in the PIAAC countries in performance variations across the age range. Such differences afford some insight into the policy problem – though it is limited (see end of this section). We can consider Figures 3a and 3b, which show results from Australia where the age group surveyed was 15–74 (wider than the 16–65 range studied in most other countries).

In Figures 3a and 3b, we can see that Literacy and Numeracy scores show an increase in assessed scores from the youngest age group, reaching a peak in the middle years (late 20s to early 40s), and then declining from the late 40s. For example, the percentage of people (males and females) with Literacy skills at Level 3 or above was 54 percent for people aged 15 to 19 years, 63 percent for people aged 25 to 34 years, 54 percent for people aged 45 to 54 years and 28 percent for people aged 65 to 74 years (ABS, 2013b). The percentage of people with Numeracy skills at Level 3 or above was 42 percent for people aged 15 to 19 years, 51 percent for people aged 25 to 34 years, 45 percent for people aged 45 to 54 years and 24 percent for people aged 65 to 74 years (*ibid.*).

In Literacy younger women outscored younger men, though "there was no [statistically] significant difference", while "(f)ewer older women had literacy skills at Level 3 or above, than their male counterparts" (ABS, 2013b). For Numeracy "more men were assessed at Level 3 or above than women at all ages, but the difference, which was ten percentage points or higher for older ages, was lower for
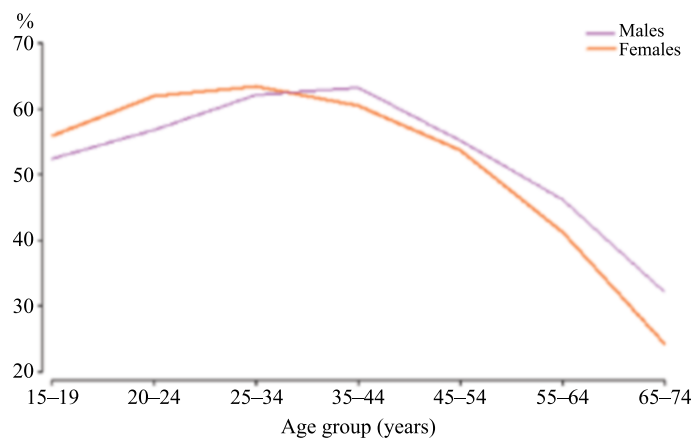
51

Figure 3a. Proportion at Literacy level 3 or above, by sex and age group, Australia, 2013.
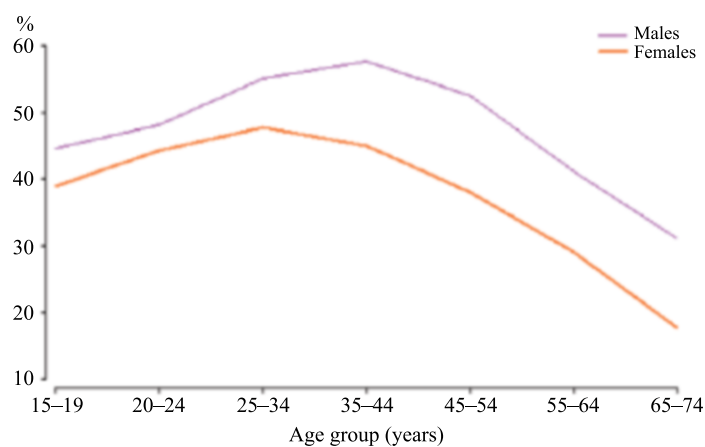*Source: ABS (2013b)*

Figure 3b. Proportion at Numeracy level 3 or above,
by sex and age group, Australia, 2013.
Source: ABS (2013b)

younger ages." Overall, one could say that younger women had *relatively higher* scores in both Literacy and Numeracy (compared to men) than older women did (ABS, 2013b).

These debates about differences in performance by age (and gender) which were evident around previous international (and national) performance studies show no signs of diminishing (e.g. Reder, 2009). The evidence from PIAAC is limited as it is, so far, a *cross-sectional* (one-off comparative), and not a *longitudinal*,

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survey.[15] The latter design responds to the need, in these discussions, to separate *age factors*, *cohort factors* and *historical-contextual* ones. For example, an individual's skills may increase or decrease as they age – or they may not. And later cohorts in most countries normally have had on average more years of formal education. And, at the same time, some groups of adults in particular enterprises in particular countries may have more or fewer opportunities to develop their skills at work.

DISCUSSION: POSSIBLE EFFECTS OF INTERNATIONAL SURVEYS AND 'COUNTERVAILING FORCES'

In considering the possible effects of international surveys on the teaching and learning of adult literacy and numeracy, we can draw on Basil Bernstein's analysis (2000) of the structuring of pedagogic institutions and discourses. This analysis and his focus on changing forms of educational knowledge and practices can illuminate shifts in the mode of governance of educational policy, in which international surveys play a role (Tsatsaroni & Evans, 2013). This framework can also be used to critique a globally promoted type of pedagogic discourse, which asserts adults' need for certain rather generic skills, and countries' need to assess these in a comparative way.

The international adult studies, like IALS, ALL and PIAAC, have no systematically thought out curriculum associated with them (unlike TIMSS and PISA). Yet the existence of such a 'curriculum' is arguably implied in the definitions of literacy and numeracy[16], the descriptions of 'levels' of performance, and the use (for numeracy) of existing classifications of mathematical content. Tsatsaroni and Evans (2013) earlier thought there was "a strong possibility that PIAAC could reinforce this type of pedagogic discourse, and the surveys could tend to work as an exemplary curriculum type which indirectly would prescribe what knowledge the adult populations *in all societies* should value, strive to acquire, and demonstrate" (Tsatsaroni & Evans, 2013, p. 178, emphasis added). Indeed, Christine Pinsent-Johnson's more recent paper (2015) shows that this "possibility" has already materialised. She demonstrates how texts and textual devices, including international assessment test tasks and descriptions of performance 'levels', developed in the context of an international skills assessment initiative like PIAAC (or IALS), are "transposed" into the context of adult literacy education, as part of the Essential Skills in Canada, a "competency-based occupational standards framework". She describes how "once the texts enter into local programmes via the Essential Skills, […] they mediate how literacy is conceptualised, taught and valued" (Pinsent-Johnson, 2015, pp. 201–202). She concludes that her textual analysis reveals, *inter alia*, the following consequences for teaching and learning: "the paucity of mechanisms in the test task methodology that can be used to inform educators about actual literacy uses in people's daily lives, and its developmental trajectory", and "the displacement and disestablishment of literacy learning expertise" (p. 202).

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There are a number of other possible effects of such performance surveys, which may come to represent 'high stakes' for adults and the countries involved. An obvious negative effect is the pathologising of countries which do not 'perform' to standards – not necessarily by the survey's sponsors, but by sections of the media, political parties, and new educational agencies, such as national assessment bodies. (cf. "PISA shock", discussed in *European Educational Research Journal*, 2012).

The emerging discourse supported by international surveys may also have effects on teachers', learners', researchers' and citizens' ways of understanding adult literacy and numeracy.[17] Knowledge comes to be seen as generic skills, flowing from a *decontextualised imagining* of the adult's everyday practices (Hamilton, 2012). This may result in differential access, across social groupings and of countries, to the principles of thinking that disciplinary or professional forms of knowledge can provide (Tsatsaroni & Evans, 2013).

Now, disciplinary knowledge, say in mathematics, can also be understood as '*powerful knowledge*' (Young, 2010) – or as 'big ideas' in mathematics education (Lerman, Murphy, & Winbourne, 2013) – that is, as ideas that have rich applicability in a range of fields. One example is the idea of *conditional probability*. This idea occurs under many guises: as 'having the *right denominator* for your proportions'; or in reporting research results (e.g. percentage of items correct) *for the appropriate population*; or in appreciating the difference between *the probability of testing positive for x, given that you have disease x* – and *the probability of having disease x, given that you test positive for x*, which is vital in understanding medical test results (Gigerenzer, 2003; O'Hagan, 2012.)

At the same time, it is worth investigating whether international surveys might afford opportunities for further research. Though results are anonymous at individual level, there is potential for relating performances of *categories of respondents* – to demographic and attitudinal data from the Background Questionnaire, and/or further information available on numeracy related practices and 'use of skills' at work. These studies may provide additional ways to study established topics, such as affect (attitudes) among adult learners (Evans, 2000). They may also provide a context for certain types of national studies, or local qualitative studies, to supplement or to probe Background Questionnaire results; for example to investigate why residents of the Australian Capital Territory might have recorded the highest proportion of adults at Level 4/5 for numeracy (23 percent; see above). There are also some examples of use of results from earlier international surveys, e.g. PISA and TIMSS, to study wider educational and social questions (see e.g. Kanes, Morgan, & Tsatsaroni, 2014; Meyer & Benavot, 2013).

In addition, OECD policy is to make available, on their website, datasets from PIAAC – and software for data analysis – for research purposes. This was done at the same time as the release of the results in October 2013. Thus, resources for researching interesting questions suggested by the preliminary results are now more accessible than before.

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We can also look to alternative research programmes to produce critical resources to help with asserting the value of alternative conceptions of educational knowledge, and with appreciating developments in adult educational policy issues, including literacy and numeracy. From within adult numeracy, we can illustrate ways to challenge the currently dominant ideas of numeracy and adult skills. For example, Coben and her colleagues have challenged the conventional 'deficit' characterisation of practising nurses' numeracy, and argued that often the high-stakes testing programmes used for this deployed instruments which lacked reliability, validity, and authenticity (e.g. Coben, 2010). Hoyles, Noss, Kent and Bakker (2010) go beyond a narrow definition of numeracy to develop a richer conception of 'Techno-mathematical Literacies' (TmLs), informed by the affordances, flexibilities and demands of information technologies, and document its use by middle ranking UK professionals, in decision-making in specific workplaces. Mullen and Evans (2010) describe demands on citizens' numerate thinking and learning, emphasising the social supports made available by government and other institutions, in coping with the 2009 euro conversion in the Slovak Republic. Gelsa Knijnik and her colleagues describe work with the Landless Movement in Brazil, facilitating their learning to recognise, to compare, and to choose appropriately from academic and/or 'local' knowledges, in carrying out their everyday practices (e.g. Knijnik, 2007).

Powerful knowledges of all these kinds can empower on a broader social basis, through knowledge located in the disciplines, professional practice, or other established practices of adults' 'lived experience'. The aim of educational researchers must be to support the development of potentially powerful knowledge (Young, 2010), like numeracy and literacy, and to prevent their being reduced to narrow competencies.

ACKNOWLEDGEMENTS

NOTES

[1] The Programme for International Student Assessment (PISA) is sponsored by OECD, while the Trends in International Mathematics and Science Study (TIMSS) is sponsored by the International Association for the Evaluation of Educational Achievement (IEA).

[2] In this chapter, I use upper case for proficiencies, as measured in the PIAAC survey (e.g. 'Literacy'); and lower case for the concept, as used by researchers or the general public (e.g. 'literacy').

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3   The reader should refer to this 2009 document for more detailed discussion on the numeracy assessment framework, and to OECD (2013a), concerning all three competencies in PIAAC.

4   Literacy items are characterised by a similar, but not identical, set of dimensions (OECD, 2013a, pp. 21–22).

5   See OECD (2013b, pp. 27–46 and 114, Table B1) for the BQ's conceptual framework and Central Statistical Office, Ireland (2013) for a copy of the BQ.

6   Respondents are presented with initial computer-based tasks; anyone uncomfortable with these takes an alternative pencil-and-paper version.

7   These levels of difficulty are estimated by the Item Response Modelling procedures; see below.

8   Round 2, including a further nine countries (e.g. New Zealand, Singapore and Indonesia), is completing fieldwork in 2014–15, and reporting in 2016.

9   The OECD Framework document indicates that the overall distribution of Numeracy items included by contexts was: Personal – 45 percent; Work-related – 23 percent; Society and community – 25 percent: Education and training – seven percent (OECD, 2013b, p. 28).

10   Respondents in the first round of PIAAC, completed in 2011–12, were supplied with hand held calculators and rulers with metric and imperial scales, for use during the interview.

11   In this chapter I use an intuitive notion of 'confidence', ranging between zero percent and 100 percent. The margin of error depends on the degree of 'confidence' desired in the estimate, but is normally two standard errors for a 95 percent confidence interval.

12   For the means and standard errors (SEs) used for calculations here, see Table 2.6a in OECD (2013a, p. 263).

13   For example, Figure 2.6a in OECD (2013a, p. 80) shows that, even if country A appears two or three 'positions above' country B in the rankings, their results may nonetheless be effectively indistinguishable ('not statistically significantly different'), once we allow for sampling variation. We can see this in the fact that the 'superiority' of, say, Finland, over the Netherlands in terms of average Numeracy score is only apparent.

14   Later analyses distinguished those at Level 1 from those 'below Level 1' (e.g. OECD, 2013c).

15   However, as indicated in the Introduction, there are aspirations to repeat PIAAC in at least some countries over time, and some longitudinal insights can be gained by linking PIAAC results to those from IALS and ALL in certain countries.

16   The definition of numeracy outlined earlier pointed to the abilities and competencies required "in order to engage in and manage the mathematical demands of a range of situations in adult life" (PIAAC Numeracy Expert Group, 2009, pp. 20ff).

17   And lifelong learning more generally (Evans, Wedege, & Yasukawa, 2013).

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