

In this month's edition of *RITE* our guest writer is **Professor Louise Archer**, recently appointed to the Karl Mannheim Chair of Sociology of Education, based in the Department of Education, Practice and Society at UCL's Institute of Education.

Professor Archer's primary research interests have been in identities and inequalities of 'race', gender and social class within compulsory and post-compulsory education. Her work encompasses research on Muslim pupils, the minority ethnic middle classes, British Chinese pupils, urban young people and schooling, widening participation in higher education and inequalities in science participation. She also has an interest in feminist theory and methodology. Currently, she is the Principal Investigator for the ASPIRES

project, a ten year ESRC-funded study of children's science aspirations and career choices and is the Director of the five year Enterprising Science project. Previously, she was lead coordinator of the ESRC's four-year research programme, the Targeted Initiative on Science and Mathematics Education. She is a member of the editorial boards of *Journal of Education Policy*, *Qualitative Research in Psychology*, and *Journal of Research in Science Teaching* and is the Vice President (Education) at the British Science Association.

Happier teachers and more engaged students?

Reflections on the possibilities offered by a pedagogical approach co-developed by teachers and researchers

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Education, contradictorily, has been proposed as both a source of oppression (being a key institution involved in the reproduction of social inequalities) and a potential tool for social mobility, liberation and transformation. As is the case in various other nations, the current education system in England is characterised by the dominance of neoliberal ideas, expressed as educational performativity, in which schools are increasingly governed by the 'methods, culture and ethical system of the private sector' (Ball 2003: 216). Notably, schools are subject to a regime of surveillance and inspection in which they are held to account for examination results and are placed in competition with other schools within an educational 'market' (Ball 2003).

As various commentators have noted, performativity can entail negative consequences – such as eroding and constraining teachers' agency, professionalism and pedagogy (eg Murray 2012; Hennessy & McNamara 2013), instrumentalising learning, damaging student learner identities (Reay & Wiliam 1999) and exacerbating inequalities between students and different types of school (Ball 2008). Arguably, performativity makes transformational education more difficult to enact, as 'technicism and standardisation' (Hennessy & McNamara 2013: 6) prioritises attainment as narrowly defined, denying the legitimacy of teaching 'beyond' or 'around', sidelining concerns for equality in deference to the service of 'quality' and reducing the spaces available for teachers and

students to innovate, reflect and 'think otherwise'.

In this article, we share insights from an ongoing research project ('Enterprising Science')¹ in which teachers and researchers have been working collaboratively to develop a pedagogical approach that aims to meaningfully engage students from socially disadvantaged backgrounds with science in ways that go beyond performative concerns with the learning of science content. Instead, this work seeks to find ways to both reform science education in more inclusive and socially just ways and to develop and realise the latent potential for science education to support and provide a space within which to develop young people's critical agency and active citizenship.

Although our approach has only been developed in relation to science, we believe it could have resonance with any subject area, but especially those which are traditionally experienced as 'high status' fields and/or those with patterns of post-16 participation that tend to privilege dominant social groups.

Science classrooms provide an apt context for the study of inequalities. In the UK, as in most Western nations, the profile of a typical university student in areas such as physics and engineering remains male and middle-class. Women and those from working-class and Black Caribbean backgrounds remain starkly and persistently under-represented (eg ; AAUW 2010; Smith 2011). Moreover, criticisms have been made of the 'white, male, middle-class' dominant culture of science (eg Harding 1998; Ong 2005) and science teaching and learning (eg Lemke 1990; Atwater 2000).

DEVELOPING THE 'SCIENCE CAPITAL' PEDAGOGICAL APPROACH

As researchers, based at University College London (UCL)² and King's College London³, we have been working with teachers for four years to co-develop a pedagogical approach that can engage students from traditionally under-represented communities with science. Our starting assumption was pragmatic: most teachers are required to deliver a particular curriculum and work within institutional constraints, hence we wanted to develop an approach that can work 'with' everyday teaching, rather than creating new resources or curricula, or requiring too radical a change in school structures. Our approach is essentially a theoretically informed 'lens', which enables teachers to work with 'how things are' but which can also enable some shifts in dominant power relations and the symbolic order and can support teachers to better connect with, value and engage students from historically under-served

backgrounds. We drew on US 'funds of knowledge' approaches (Moll et al. 1992), which have been proposed as an equity-orientated, non-deficit approach to working with students from minoritised communities. We combined this with a sociologically inspired approach (derived from the work of Bourdieu (eg Bourdieu 1977, 1984), termed a 'science capital approach'; see Archer et al. 2015) that aims to focus attention on changing the 'field' – that is, the power relations and symbolic order which set the 'rules of the game' within a context (see Archer et al. in review).

Over the course of several whole-year cycles, we worked collaboratively with teachers (through group sessions and regular lesson observations and one-to-one reflection meetings) to develop an approach that elicits and values students' ideas, experiences and cultural knowledges, and links these with science, with the aim of reducing the 'gap' between student '*habitus*' (their dispositions, 'feel for the game'), their '*capital*' (their cultural, social and economic resources) and the '*field*' of science education/the science classroom. The approach involved teachers modifying existing lesson plans to take account of student contributions, identities and experiences and to then link these back to the science topic, skills or content in question, a process that was denoted by the shorthand 'Elicit–Value–Link'. The *Elicit–Value–Link* method of modifying lesson plans aims both to support teachers' valuing of students (and their diverse ways of being/doing) within science classes and facilitate the translation of students' experiences, identities, interests and 'real world' knowledge and competencies ('use-value capital') into outcomes that might enhance their agency and social mobility ('exchange-value capital'). We also explicitly asked teachers to modify their lesson plans in ways that ensured the challenging of stereotypes (eg about 'who' does science) and to broaden and diversify the range of ways that students might be recognised as 'doing science'

within their class (eg what 'counts' as science, valued ways of performing scientifically). In this way, we hoped that the approach might help reconfigure the dominant culture of science, particularly along gendered, classed and racialised lines. Teachers thus sought to move beyond contextualising science, to a more immediate and tailored reconfiguration of science as *personalised and localised* for their students.

PARTICIPATING TEACHERS

As work is still ongoing at the time of writing with our current sample of teachers and schools (in Newcastle, York and Leeds), in this article we focus on findings from work conducted in 2015/16, with nine teachers from six inner-London schools, who participated in a nine-month development and trial of the approach. Schools were selected on the basis of having relatively high proportions of students who spoke English as a second language and were registered as eligible for free school meals, compared to other schools in the same local area. The teachers each chose one main class to focus on, which produced a spread of year groups (1× Year 7 class, 3× Year 8, 3× Year 9 and 2× Year 10) and attainment (set) groupings (4× bottom set, 2× middle set and 3× top set). With the exception of students in Ms Smith's school, students came predominantly from working-class backgrounds and a range of ethnic backgrounds, of which African, Caribbean, Bangladeshi, Turkish, Polish and Portuguese were most commonly represented. Data include field notes from nine months of classroom observations, 13 discussion groups conducted with 59 of the participating students and interviews/workshop discussions with the nine teachers and survey data collected from students in each class.

'HAPPIER' TEACHERS AND 'MORE ENGAGED' STUDENTS

Overall, as we discuss in more detail elsewhere (Archer et al. in press, in review; King & Nomikou, in press; Nomikou et al. in review), we found that teachers and students were overwhelmingly positive about the approach, identifying a range of desirable outcomes. For instance, students and teachers reported that the approach made lessons more 'interesting' and, as end-of-year surveys indicate, students in intervention classes were significantly more likely than students who took part in a wider, national survey to agree with survey items such as 'I learn interesting things in science' (75.7% intervention students vs 68.2% national sample). As Tanisha, a Year 7 mixed ethnicity girl, put it: 'It makes the lessons fun'.

Students and teachers felt that the 'big difference' was that the approach had notably increased student understanding and engagement with science because it enabled students to see and experience a personal link with science, rather than its remaining abstract and at a distance from students' everyday lives. The personalisation of content also provided a more immediate frame of reference to help students make sense of the content and concepts they encountered. As Tahir, a Year 10 Turkish boy, explained, 'it's a better way to make us remember things'. Some teachers also reported quantifiable gains in attainment over the year.

Student participation in classes and class discussions broadened over the year, and observations showed how the approach seemed to encourage a wider range of students to voice their views in class, particularly those who were usually quiet and tended not to participate publicly. As one student reflected, 'cos like it brings everyone together, like, everyone has like something to say, instead of it just being like one or two people that know the answer'.

While, for some teachers, the approach was quite close to their existing practice, representing an enhancement and development of how they usually taught, for others it was a more significant departure. For instance, Ms de Luca explained how she had changed her usual 'strict' practice from closing down student discussion, explaining 'now I kind of give them a bit more space to talk because I know that it's helping them to relate and engage more with the topic'.

All the teachers felt that the approach had supported them to change their practice in meaningful ways (a change also noted by their students). Even the very experienced and highly competent teacher Ms Smith reflected: 'That's been a best part, you know – it really has changed how I teach.' Teachers reported that they felt the approach had helped them to get to know their students better – and students reported feeling like the social distance between themselves and their teachers had been bridged a bit. Or as one student termed it, they felt the approach had made science lessons more 'friendly'.

For us, one of the key changes was an increase in teachers' own personal satisfaction and agency (see King & Nomikou in press). As Mr Hobbes explained, 'It's making me happier as a teacher.' It is not uncommon for teachers to report experiencing sustained professional development in these terms, but one of the interesting aspects for us was teachers' views that the approach helped to provide a framework and impetus for 'meaningful' teaching, which valued their professionalism, renewed their sense of purpose in teaching and enabled them to push back (to an extent) against educational performativity. Teachers described how they valued teaching for understanding (rather than 'to the test') and the approach helped justify this and shift their students' expectations away from instrumentalised approaches. Students themselves noticed (and liked) the difference in their teachers' approach,

which they commonly described as 'going off topic'.

The teachers also reported how, over the course of the year, their colleagues came to show an increased interest in the project. At the outset, some teachers reported that some of their colleagues were uneasy or expressed concerns as to whether their 'trailing' of the approach might impact negatively on test and examination scores. However, these concerns seemed to dissipate as the year progressed – not least when such fears were not realised. Although cascading of the approach was not part of the project remit, by the end of the year, teachers were reporting positive interest and even a strong demand for them to cascade and share the approach with colleagues.

Of course, the trial was by no means an unbridled success – alongside the positive developments and gains reported above, the participating teachers needed to invest considerable time and energy to get to grips with the approach, particularly in the early stages. They all recounted needing to dedicate extra planning time and most found it substantially harder to enact with Key Stage 4 classes, where the demands of educational performativity were experienced the most acutely. In this respect, we suggest that the findings should be interpreted as interesting and promising, rather than definitive. Moreover, the findings suggest that many teachers would have benefited from more than just one academic year's worth of support to fully embed the practice and that while the approach was deliberately formulated as a pragmatic, 'here and now' instrument for mitigating some of the pernicious effects of performativity, its potential was still constrained by the demands and injuries of performativity – which we interpret as underlining the importance of continuing to argue for both immediate and longer-term ideological changes in education in order to foster greater social justice.

CONCLUSION

Changing professional practice and trying to develop and enact social justice-orientated interventions within the existing education system is incredibly difficult and challenging: considerable investments of time, energy and emotion are required, alongside significant levels of cultural, social and economic resourcing. In this respect, the approach described in this article is certainly not a 'quick fix'. However, it may offer interesting insights to other teachers and researchers, not least as it suggests that some meaningful changes can be enacted in ways that are supportive for teachers and students from under-served communities and relatively easily (in terms of being cost-effective and not requiring substantive changes in curricula or teaching materials) through a change in 'mindset'. Moreover, our findings lend additional support to ongoing calls regarding the importance of providing teachers with regular time and support for reflection and opportunities for dialogue and development so that they feel able to grow and innovate in

their practice – something that is arguably even more crucial within the current regimes of educational performativity. ■

1. The five-year 'Enterprising Science' project – a research and development project conducted by King's College London, in partnership with the Science Museum, funded by BP. See www.kcl.ac.uk/enterprisingscience.

2. Louise Archer, Jennifer DeWitt, Spela Godec and Effrosyni Nomikou (all UCL Institute of Education) and Emily Dawson (UCL).

3. Heather King and Ada Mau (King's College London).

May 2021 Postscript

I rarely, if ever, re-read my own publications (for the same reason that I tend to avoid looking at photographs of what I was wearing in the 1980s – clothes that may have passed muster at the time can look embarrassing and anachronistic now!). So it was with some trepidation that I agreed to Gerry and David's request to revisit my original 2017 article. However, re-reading it led me to reflect on how our research has evolved. We completed the second trial (referred to in the article) with the teachers in Newcastle, York and Leeds and co-produced the freely accessible *Science*

Capital Teaching Approach Handbook, which has since been translated into a number of other languages and has been accessed by teachers in over 80 countries around the world, along with a range of other associated resources. We are currently funded by the Primary Science Teaching Trust and The Ogden Trust to work with teacher colleagues to co-develop a new version for primary – which is due to be published in Autumn 2021. The new primary work has allowed us to develop and refine the approach – for example, clarifying the social justice foundations of the model and articulating more clearly how the approach seeks to shift dominant power relations and support children's agency. This work has been ongoing against the backdrop of the COVID-19 pandemic and lockdown and is a testament to the dedication and determination of our teacher partners. In particular, the article has reminded me what a pleasure and a privilege it is to have been able to work with so many inspiring and amazing teachers over the years. We have learned so much from them – and I hope these partnerships continue for many years to come. ■

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