DOI: http://doi.org/10.5007/2175-7941.2025.106722

(Science) teacher education in England: technical-rationality and depoliticisation of science education[+*]

I. Introduction: teacher education in England

I write this piece as a Brazilian science educator who has been researching and working in the Higher Education sector in England for the past 10 years. During this time, I have come across many differences in how teacher education and work operate between these two countries I have linked my professional trajectory to. In England, for instance, the majority of initial teacher education (ITE) courses are of a postgraduate nature both at primary (ensino fundamental I) and at secondary (ensino fundamental II and ensino médio) levels, with only very few ITE experiences happening in the form of undergraduate courses (licenciaturas). These postgraduate level courses are called Postgraduate Certificate in Education (PGCE) and normally last 1 academic year, mixing school experiences through placements/internships with academic input in relevant disciplines for education (often, but not always, by university-based lecturers). In these courses, student teachers are expected to engage with both general education topics (e.g., cognitive sciences, curriculum theories, issues of inclusion and special needs, etc.) and subject-specific topics (related to physics education, chemistry education, history education, etc.), depending on their specialisation as a teacher of a particular subject. In the particular case of secondary school teachers, this means choosing their PGCE course on the basis of their original undergraduate degree: someone with a Bachelor's degree in Chemistry would normally be selected into a PGCE Science/Chemistry course; whilst someone with a Bachelor's degree in History would normally be selected into a PGCE Science/Chemistry course[1].

Despite these marked differences related to ITE in England when we think about Brazilian ITE, in the past couple of years I have found myself constantly explaining to colleagues in Brazil how the changes put in motion there by the Base Nacional Comum Curricular (BNCC) are very familiar to those working in the education sector in England. In many (negative) ways, we could say that in the context of national educational reforms of a neoliberal and technical-rational nature the like the BNCC (Filipe *et al*., 2021), England has

[+] Formação de professores (de ciências) na Inglaterra: racionalidade técnica e despolitização da educação científica

[*] *Received: April 23, 2025.*
Aceito: April 24, 2025.

[1] Effectively, this means anyone with a Bachelor's degree can apply and undertake this 1-year PGCE course, no matter their original degree, as long as it can fit with one of the school subjects normally thought in English schools. For instance, an Engineer could undertake a PGCE course in Maths, Science, Design & Technology, Computing, etc.

been decades ahead of Brazil, including in how such reforms impact teachers' education and work. In this case, England can be seen as a cautionary tale for the medium and long-term impacts of these kinds of reforms.

As such, in this piece I will endeavour to give an overview of how educational policies related to teacher education and work in England – see Table 1 below – have been framing the teaching profession, with special attention to how it has been shaping science teachers' work as technical-rational and apolitical. Of particular concern to me, as a science educator working both at ITE and Continuous Professional Development (CPD) level, is that increasingly complex and intertwined socio-scientific and social justice issues have become the norm across the world in the past decades[2], exemplifying the growing complexity of the relationships between scientific knowledge and practices, socio-political challenges and injustices. However, science education at practice and policy levels seems to remain rooted in a technical-rational perspective, often portraying science through a naïve positivist lens as neutral, objective, and disconnected from power, culture and socio-political structures and practices (Bazzul, 2020; Rezende; Ostermann, 2020; Moura *et al*., 2025). Thus, if we are to defend a socio-political and social justice turn for science education, examining the current framing of the science teaching profession across countries like England (and Brazil) becomes crucial.

Table 1 – Some core educational policies affecting teacher education and work in England.

Document	**Original publication**	**Notes**
Teacher Standards/TS	2011	*Guidance on teachers' work across the country.*
National Curriculum – Science/NC	2013	*Minimum learning expectations (content and skills) for each subject area offered by the state education sector.*
Early Career Framework/ECF	2019 (updated version: 2021)	*Minimum curricular content for CPD targeting early career teachers in the first two years in the profession (mandatory for two years after ITE).*
Initial Teaching Training Core Content Framework/CCF	2019	*Minimum curricular content for ITE programmes.*

[2] Such as in the case of the COVID-19 pandemic and the inequitable distribution of healthcare resources and outcomes, environmental degradation and climate change denial, and the resurgence of pseudoscientific racism.

Political Impartiality in Schools/PIS	2022	*Guidance on schools' and teachers' work in relation to political matters.*

II. Educational policies and reforms in England: an overview

According to Ball (2016), educational policymaking is increasingly shaped by global policy networks – often referred to as the Global Education Reform Movement (GERM) (Avelar; Ball, 2019) – promoting a particular neoliberal technical-rational perspective on and approach to education and educational reforms. Players in such networks include both international institutions (like the OECD, World Bank, UNESCO, IMF) and philanthropic bodies (e.g., Lemann Foundation, Gates Foundation), which often frame neoliberal technical-rational perspectives on education as 'policy solutions' to address challenges of educational quality and inequalities (Tarlau; Moeller, 2020). Through this perspective, national educational policies, including those related to teacher education, become embedded in broader meta-narratives that position education primarily as a means of producing human capital to contribute to national productivity and global economic competitiveness (Lingard; Sellar, 2013).

As a result – and as critiqued by Tarlau & Moeller (2020) and Avelar (2019) – these policy solutions end up framing political and ethical questions as merely technical matters to be 'solved' through technical solutions, removing educational practices and thinking from the political sphere and leading to what they describe as a 'depoliticisation of education'. These policy discourses often materialise in educational systems across the world in the form of "assessment and data analytics, PPPs [public-private partnerships], impact measurement, charter schools/academies, blended learning, entrepreneurship and leadership" (Ball, 2016, p. 14), privileging top-down standardisation of education; core subjects; low-risk ways of teaching; corporate management and test-based accountability practices for schools (Avelar; Ball, 2019). In the Brazilian context of the BNCC, for instance, Avelar (2019) and Filipe *et al*. (2021) examine the transformation of school management into a technocratic, business-like activity rather than a democratic one, and the recent narrowing of curriculum towards labour-market oriented subjects and skills at the expense emancipation, critical consciousness, and social action.

Teachers, in this context, become "enrolled into grand political narratives of policy which link their classroom work with students to the processes of globalization and national economic competitiveness" (Ball *et al*., 2012, p. 72-73). As a result, they are positioned as agents/implementers of these neoliberal technical-rational policy solutions through being granted what Dale (1979 in Ball, 1993) has termed as 'regulated autonomy' (permission to operate within policy parameters), but denied 'licensed autonomy', which would allow them to adapt, challenge or go against the grain of such policies, should they wish so. Instead, as Unsworth *et al*. (2023, p. 2) suggest, teachers are 'immunised' through policies ensembles governing their education and practice that define "what it means [for teachers] to have and use

‘effective’ knowledge, constraining ideas of effectiveness within a limiting and reductive ideology of standards and standardisation”. They expand on this argument by noting that:

> *policy becomes ‘a protective response in the face of a risk’ (…) – a move to counteract or address unwanted and undesirable issues that can cause anxiety. As such, policy may become a ‘prophylactic vaccine’ to protect – to immunise – against risk or the emergence of future risks and unpredictable events impacting the social group. In other words – and in terms of the positive/negative dialectic – policy immunises the social world in the provision of a positive defence strategy in order to resist as well as overcome the disruptive and uncontrollable ‘other’ existent in (negative) spaces outside of this positive, knowable field.* (Unsworth *et al*., 2023, p. 4).

In England, these neoliberal technical-rational discourses surrounding education have been translated into education policy via the principles of ‘New Public Management’, a market-driven perspective of management that moved from the private sector into public services. According to Lingard and Sellar (2013), this shift began in the 1980s with the Thatcher government and was further advanced in the 1990s and 2000s under the New Labour government, which framed the ‘competitive state’ as a successor to the post-World War II ‘welfare state’. It encouraged the participation of a range of new actors, such as private enterprises, think-tanks, charities, and religious bodies, in education: they were allowed to open and run public/free schools funded by the state, deliver teacher education, and develop curriculum materials; they also took part in shaping education reforms in the country via advisory roles in government consultations, including on current teachers’ professional development policies like the Initial Teacher Education Core Content Framework (CCF) and the Early Career Framework (ECF).

A key feature of these educational policy reforms in the country has been the emphasis on an ‘evidence-based education’ model: a technical-rational perspective on pedagogies and school-wide management practices grounded in causal models of interventions about ‘what works best’ (or ‘best practices’) as education solutions. This model is centred in the notion that undertaking randomised control trials about education interventions offers a universalised evidence base[3] of what educational practices ‘works best’[4] instead of those informed by tacit, practical, and local knowledges and praxis (Biesta, 2010), in close connection to discourses framing policy solutions as technical-rational and apolitical ones (since they are based in scientific evidence from supposedly technical and objective research). As a result, the teaching profession is reimagined – at least in the eyes and wishes of regulatory agencies (e.g.,

[3] What counts as ‘evidence’ (or how ‘evidence’ is understood) under this particular agenda has historically not been explained by policy documents in England, as noted by Biesta (2010).

[4] Similar to the work done by QEDU in Brazil (https://qedu.org.br/sobre), “an organization that promotes the use of educational data to improve the quality of schooling” (Tarlau; Moeller, 2020, p. 346). And similar to how, also according to Tarlau & Moeller (2020), the Lemman Foundation invested in particular kinds of research to support the writing of the BNCC’s learning standards grounded in a specific evidence-base of best practices.

Department for Education/DfE) – as a group of implementers of standardised pedagogical practices and knowledges that are deemed to 'work best' within state education, with little space for their professional judgement, contextualisations, and practical epistemologies (Biesta, 2010; Maguire *et al*., 2010; Cowen, 2020; Unsworth *et al*., 2023).

In addition, any critique of such technical-rational perspectives is consequently discursively positioned as anti-technical (or anti-evidence), ideological, partisan, and not interested in supporting 'quality education'. That is, we see the rise of 'marginalisation of critique' within educational praxis, as examined by Clarke & Lyon (2023) in the case of England's educational policy reforms[5] (see also Tarlau; Moeller, 2020 for the case of the BNCC reform in Brazil). Such landscape creates an atmosphere in the education sector defined by technical-rational models of educational praxis and by the suspicion about, and often suppression of, critique and of diverse ways of conceptualising pedagogies, curriculum, and teachers' work. In other words, English education policy has been increasingly shaped by the 'immunisation' perspective mentioned above, designed to protect the 'evidence-based' system from dissent and alternative ways of thinking and doing education.

In the particular case of teachers' work and education, policies such as those listed in Table 1 are referred to as 'teacher-proof policies' intended to protect the profession from non-compliant teachers, that is, "to vaccinate teaching practices against the influence of the teacher subject's autonomy, judgement and ethics" (Unsworth *et al*., 2023, p. 5). This can be exemplified by the DfE's guidance on 'Political impartiality in schools' (DfE, 2022), framed as a policy to guide teachers in their engagement with organisations ('external agencies') that have been recently linked by the current UK government to 'partisan views' (which, according to the guidance, need to be avoided as part of teaching practice), such as the Extinction Rebellion and Black Lives Matter movements:

> *Where schools wish to teach about specific campaigning organisations, such as some of those associated with the Black Lives Matter movement, they should be aware that this may cover partisan political views. These are views which go beyond the basic shared principle that racism is unacceptable, which is a view schools should reinforce. Examples of such partisan political views include advocating specific views on how government resources should be used to address social issues, including withdrawing funding from the police.* (DfE, 2022, n.p.).

Outcomes from such reforms in England have, according to Ball *et al*. (2012) and Clarke and Lyon (2023), reduced its educational policies surrounding teachers' work and education to essentially the achievement of first order educational outcomes: 1. the teaching of

[5] As recently exemplified by the kind of relationship the England's Department for Education (DfE), under the previous Conversative government, has established with academics and school staff who are critics of their work. See here: https://www.theguardian.com/education/2023/sep/30/revealed-uk-government-keeping-files-on-education-critics-social-media-activity & https://www.theguardian.com/politics/2023/oct/21/uk-government-keeping-files-on-teaching-assistants-and-librarians-internet-activity.

skills and dispositions (pre-defined by the evidence-based practices agenda mentioned above); and 2. behaviour management; with less concern about second order educational outcomes (such as equity, justice, or democratic engagement). In the next section, I will further explore how this technical-rational policy landscape currently embedded in the English education sector has been shaping science teacher education and work in the country, particularly in relation to questions of socio-political and social justice nature within science education (Moura, 2025).

III. Teacher education and work in England: a view from science education

Current policy documents related to teacher education and work in England (see Table 1) are often framed using the language of either 'guidance' – primarily for teacher educators and teachers – or 'entitlement', which is generally directed at student teachers and early career teachers. That is, the language across these documents fluctuates between issuing demands or obligations particularly targeting ITE providers, and outlining rights or entitlements by student teachers and early career teachers. The particular language of 'entitlement' found across teacher education policies – such as the CCF and the ECF – must be understood in relation to two broader issues in the English education sector. Firstly, there is growing criticism from academic communities and educators regarding the neoliberal technical-rational approach to school-based education, including teachers' work, grounded in the claim that the neoliberal reforms mentioned in the previous section have failed to deliver on their promises, whether improving student outcomes, increasing social mobility, or enhancing working conditions for teachers. Secondly, the profession faces an acute crisis in recruitment and retention (especially in the first 5 years of a teacher in the profession), with teacher numbers in steep decline across different subjects, including sciences, since the early 2000s. In response, recent policy documents related to the profession in the country seem to be framed more as forms of 'entitlement' rather than regulatory imposition. The ECF, for instance, claims to offer "supportive professional development content and strategies" designed to make teaching "more fulfilling and successful" (ECF, p. 4), particularly targeting teachers in the first two years in the profession as a mandatory CPD curriculum to be offered by their own schools.

These developments also affect how the actors involved in these policies are represented. More recent teacher education policies like the CCF and the ECF (both from 2019) emphasise collaboration and consultation in their development, stating they were developed "in consultation with the following members of an Expert Advisory Group and in collaboration with a wide range of teachers, school leaders, academics and experts" (ECF, p. 2). This discoursive move seems to be attempting to reduce the social distance between policymakers and practitioners, echoing Fairclough's (2013) observations about powerful institutions like the World Economic Forum using consultation mechanisms to respond to critiques of undemocratic, neoliberal policymaking. However, these advisory groups tend to be highly selective, often comprising organisations that have benefitted from or directly emerged through

neoliberal reforms, with university-based and social movements and groups (e.g., teacher unions) input being often limited.

Structurally, policies related to teacher education and work tend to follow a familiar pattern: a brief introduction outlining intended use and target audience, followed by a body segmented into thematic areas presented via tables and bullet points. These segments contain short declarative statements about what teachers should 'learn that' and 'learn how to', normally presented as factual claims on educational practice and knowledge, steeped in an understanding of teacher education and teachers' work as knowledge and skills transmission, such as: "Teachers should learn that pupils are motivated by intrinsic factors (related to their identity and values) and extrinsic factors (related to reward)" (ECF, Standard 7, p. 22); "[Teachers should learn how to] Avoid overloading working memory (…) - following expert input - by taking opportunities to practise, receive feedback and improve at breaking complex material into smaller steps" (CCF, p. 11). In particular, across these documents a clear normative vision of teacher identity is being constructed: one that values accountability, behaviour management skills, and knowledge transmission skills. As Hordern and Brooks (2024, p. 10) explain, the 'learn that' and 'learn how to' formulations in both the CCF and ECF serve to:

> *translat[e] the work of professional groups such as teachers into forms amenable to accounting, a 'disaggregating' of work into specific tasks that could be assessed against performance standards. (...) This process can be manifested through official documents that enscribe ways of 'reorganising' workplace practices into sets of isolable (and therefore trainable and measurable) discrete tasks. (...) The mode of functional analysis practiced by behaviorist competency approaches also carries with it assumptions about control, power and authority. In pulling apart longstanding workplace cultures and seeking to render invisible the tacit and relational aspects of professional activity, functional analysis provides for a codification that enables greater levels of managerial and state control of professional work.*

Such processes exemplify what Biesta (2010) terms 'learnification' of education: the reduction of teaching to the managerial oversight of learning processes, erasing the ethical and relational dimensions of educational work. As a result, teacher education (initial and continuous) is in itself also reduced to teachers 'learning that' and 'learning how to' manage the learning processes of their students. And about these learning processes, these policies frequently claim to draw upon "the best evidence available for quality teaching", but while they feature long reference lists, the links between specific content statements about what teachers should 'learn that' and 'learn how to' and particular studies are rarely made explicit. Consequently, teachers and readers cannot easily trace the epistemological lineage of the claims made about what they should know and do in the profession (Hordern; Brooks, 2023). This becomes significant when viewed through the lens of science education and, in particular, in connection to its links to socio-political and social justice issues within science teachers' education and work in England, since these teacher education and professional development

policies such as the CCF and the ECF foreground teachers' development of generic knowledge and skills about instruction and behaviour management, instead of critical thinking and awareness about their subject areas and, more broadly, about education as a moral-philosophical endeavour (Hordern; Brooks, 2023).

That is, instead of supporting science teachers in their knowledge development about science's complex entanglements with society, these policies focus solely on teachers' learning of non-subject specific ideas and skills that will help their students 'learn better' the stated content in the National Curriculum (NC). For instance, whilst Standard 3 of the CCF and ECF policies (Subject and Curriculum) is explicitly framed as expecting teachers to "demonstrate good subject and curriculum knowledge", and standard 8 (Professional Behaviours) states that teachers should learn "how to develop as a professional, by strengthening pedagogical and subject knowledge by participating in wider networks" (ECF, p. 24), no mention to teachers' own critical thinking and moral-philosophical reflections about their subject areas (such as through learning about their subjects' own socio-historical, philosophical and contemporary connections with diverse societies) is found across these documents. This raises potential obstacles to science teachers' work grounded in socio-political and social-justice issues in England, since they have been facing a de-prioritisation of these kinds of professional knowledges about their subjects' moral, socio-historical and socio-political entanglements.

Other documents such as the 'Political impartiality in schools' guidance and the NC for Science seem to be reinforcing an even narrower vision of what science teachers should learn and do. For instance, the NC (2013) defines the knowledge that should be taught by science teachers in order to form "educated citizens," describing this knowledge as "the best that has been thought and said", assuming a fixed, uncontested canon of scientific knowledge (a Eurocentric one). It also constructs an instrumental link between scientific knowledge and citizenship, ignoring broader, more participatory understandings of civic engagement within science education that involve criticality, action, or social transformation. Missing from this vision is any substantial consideration of science teachers' education and work towards supporting students' engagement with justice-oriented and sociopolitical issues. Similarly, in the 'Political Impartiality' guidance, drawing on examples found in the document that bear close connection to school science, we find, for instance:

> *Schools might encourage pupils to think about environmental issues and consider how this impacts them personally. This might involve setting up a group for pupils to discuss these issues and take steps to reduce their own, and the schools', environmental impact. Teachers and staff should support this and can help pupils to act and conduct non-political activities. Legal duties on political impartiality do not prevent initiatives which focus on addressing live and relevant issues like this within the school community. It would not be appropriate for a teacher to suggest that pupils join a certain campaigning group or engage in specific political activity, for example, an upcoming protest. (PIS, p. 33).*

> *Following their efforts during the coronavirus (COVID-19) pandemic, pupils and staff at a school may wish to display a banner showing their appreciation to NHS staff. A message such as 'Thank You NHS' or similar would not present a risk to political impartiality as it is unlikely to be perceived as promoting partisan political views or compromising the balanced treatment of political issues. However, if the school were to display a banner demanding reform to the NHS or changes to NHS funding levels, this would not be appropriate and risks breaching their requirements on political impartiality. (PIS, p. 37).*

In the first example, we see a positioning of discussion groups and school-based initiatives around climate change as non-political activities at the action/practice level, potentially because such discussions and decision-making activities would be undertaken based on a consensual viewpoint within the group and would not be related to structures of governance at the government level. Similarly, in the second example we find at practice/action level that supporting the existence of the NHS (the British healthcare service) is not political, but supporting its reform, including funding reform, is political, potentially because it would imply in making specific demands on the current government, thus relating to the use of power in the running of society. Such positioning of what constitutes political views and actions within education can be further linked to the framing of hegemonic ideas and practices as consensual across the English society and, as such, as apolitical. Counter-hegemonic ideas related to reform and social transformation at the epistemological and/or action/practice levels, on the other hand, are framed as political and, as a result, in need of a careful 'impartial' approach by teachers through the "balanced presentation of opposing views on political issues" (PIS, p. 7).

Thus, the science teacher is expected to be educated to be politically impartial whenever socio-political issues emerge: someone who teaches about (or 'presents') political issues through a "fair and dispassionate approach" (PIS, p. 10), and someone who does not 'suggest', or 'promote', or 'encourage' students to engage with political action/practice in relation to socio-political structures outside the school environment. It is then also worth looking closely at the document's definition of 'balance' (or 'impartial') as presenting "at least 2 significantly different perspectives" [but still] "using their reasonable judgement. They should not take a mechanistic approach to ensuring a balanced presentation of opposing views" (PIS, p. 13). Power relations and structures are invisibilised from such scenario: how balance can emerge from complex power structures – such as in the case, for instance, of balancing Black, Indigenous, and People of Colour voices versus oil and industry voices in climate change teaching – is not clear nor acknowledged. As argued by Dunlop and Rushton (2022, p. 11) about the impact of this policy on environmental education in England, this emphasis on a 'balanced' presentation of knowledge about issues that have a socio-political dimension such as climate change and the concern with 'encouraging action' and transformation "shifts issues into an unquestioned (depolitical) sphere, which disempowers teachers and young people from negotiating disagreement and taking action". As similarly put by Bazzul (2020, p. 83), it

prevents a "process of disruption of what is sensible/thinkable/doable in order to realize new forms of equality".

In addition, the potential degree of confidence in science teachers' professional judgement about how to undertake such balanced political impartiality approach in their teaching often becomes a hegemonic trap when considered against a backdrop of lack of professional development related to socio-political knowledge noted above, and of inspection and standardisation pressures that privilege the particular kinds of consensual knowledge of science (products and processes) I outlined above. This expectation that science teachers ought to balance political views/issues should they decide to bring socio-political dimensions of science into their lessons plays into the low-risk pedagogies mentioned earlier in this article: reduction of creative, argumentation, critical thinking-informed pedagogies; and emphasis on classroom behaviour control (Ball, 2003; Clarke, 2023; Unsworth *et al*., 2024). Such expectation, with no professional development support, places great responsibility on science teachers to 'tread carefully' – borrowing from Dunlop *et al.* (2024) – in this socio-political landscape, without time and resources to properly delve into diverse and counter-hegemonic views that are often relegated to hidden places within their science subject-specific knowledge and education. Indeed, according to a study in England by Dunlop & Rushton (2022), such legal expectation on balance ends up discouraging them from engaging with the political dimensions of climate change; they often remain, instead, at the factual scientific knowledge level, which is deemed as epistemically apolitical. Indeed, such low-risk apolitical approach grounded only in factual account is encouraged by the PIS itself: "Where schools remain unsure if a topic is a 'political issue' it is advisable to avoid promoting a particular view to pupils. Instead give a balanced factual account of the topic, in line with the legal duties on political impartiality" (PIS, p. 10).

IV. Teacher education and work in England: a view from science education

Taken together, policies guiding science teacher education and work in England depict a science teaching profession defined by the delivery of pre-determined, objective, and universal knowledge from an apolitical standpoint, targeting measurable student outcomes through test-based teaching and behaviour management. They leave little room for the relational, ethical, and transformative elements of science teaching, particularly those aligned with socio-political and social justice dimensions. Indeed, as noted by Clarke (2023) and Unsworth *et al.* (2024), neoliberal and neoconservative moves to 'immunise' against political perspectives in education have been emerging England in the past decades, transforming issues of socio-political engagement, activism and transformation – including against social injustices – into meritocratic and individualist endeavours of social mobility and labour in a competitive world. As a result, the science teaching profession is framed as one of managers of students' learning and, consequently, science teacher education and work becomes a process of producing the 'right kind' of science teachers – with the right kind of knowledges and skills, and avoiding

the ‘wrong kinds’ of knowledges and skills – that will work towards these neoliberal technical-rational goals for (science) education in the English society.

As I noted in the opening section to this article, the recent developments around the BNCC in Brazil seem eerily familiar to those of us working in the education sector in England. So I hope this brief examination of the English case can offer some lines of sight for the kinds of impact of such reforms in Brazil, and for the kinds of resistance-based responses that might be needed from the science education community in Brazil in the coming years.

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