CERG Lecture

How far has science education come since the Warnock report?

What educational research tells us

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Different historical legacies
Post-Warnock (and post-comprehensivisation)

Science was available to greater numbers of learners, as were specialist teachers, but uneven uptake.

Seen as central to economic and political supremacy

“Suitably adapted science activities might have much to offer children with SLD in terms of increasing their knowledge of the world around them and also their desire to explore it.” Brooke and Solomon, 2001: 943)

After a flourishing of science education from the 60s to 80s, a unified view of science was enshrined in NCS

Subsequent revisions resulted in an incremental diminution of Nature of Science and alternative facets of science

Performativity saw applied subjects being subjected to academic assessment, other outcomes have been ignored
Research case study 1
Teacher education for inclusive practice – responding to policy

Dr Nafsika Alexiadou & Dr Jane Essex

- Looked at institutional mediation of government policy by one English university
- Contributors were 7 lecturers, 45 pre-service teachers, staff and pupils at partnership schools. (Funding facilitated scale).
- Data used was policy documents, course materials, essays submitted for assessment, lecture and workshop observations, questionnaires and interview data
- Found that regulatory frameworks, coupled with inspection, powerfully shape practice through marketisation and performativity agendas.
- Inclusion is interpreted by ITE staff in a context of local need and is thus culturally sensitive.
- Inclusion takes account of notions of ‘ability’, often accompanied by segregation, and diversity, specifically multi-culturalism.
- It is viewed as synonymous with good teaching, that is teaching which is graduated and incorporates targeted adjustments into material which is well understood. Not always well integrated into the ITE course.
- Better preparation for inclusion would require a policy framework that doesn’t rest on deficit assumptions.
- ITE students need to be supported in challenging current practice and assumptions if inclusion is to be more meaningful.
The purposes of science education could be considered to be:

• Good (science) education should achieve the following:

• **Socialisation**: gaining social and cultural knowledge, skills, insights and dispositions.

• **Subjectification**: gaining expertise in a subject, learning to ‘think/see like a scientist’, pre-specialist education.

• **Qualification**: the acquisition of knowledge, skills and dispositions necessary to advance further in an area.

  (Biesta, 2010; Phillipson n.d.)
Literacy, an illustration of possible responses to the inclusion agenda

- Technical vocabulary is a key element of formal science, conveys rich meaning ‘economically’, required in assessments. Various strategies can be used to help all pupils develop fluency in the target vocabulary.
- Careful selection of the key words/phrases
- Repetition of target terms
- Strategies to help pupils make conceptual associations with technical terms e.g. writing a glossary, pictographs, word bingo, charades......
- Technical approaches to accuracy e.g. morphographs, aurally coded dictionary
- But these approaches all take teaching time and may feel like a distraction from content delivery. What we don’t do is discuss critically why we use technical language and what alternative words might be more accessible for some learners and acceptable for assessment purposes.
Research case study 2:  
*Creating a modern asylum*  
*(currently under review)*

Questionnaires, with open and closed questions, completed on a voluntary basis

Surveyed 21 staff bring pupils to chemistry festivals, some designated as suitable for participants with SEND/ASN

Thematic analysis showed that:

Staff saw science as serving distinctive learning purposes when undertaken by learners with SEND

A surprisingly high level of consensus around science as being ‘ideas and evidence’

Different resourcing and staffing of science education for SEND and non-SEND

Science widely perceived as a vehicle for the development of transferable skills and affective outcomes for SEND/ ASN learners, not the means to career development

Exclusionary effect, despite policy and legislative reform in the UK, created by the curriculum & role models; science is not seen as an educational and cultural entitlement for all. Hence, staff do not see science outreach events as truly open to all.

Science educators need to monitor the hidden messages about the accessibility of the subject and signal commitment to ‘science for all’.
PREPARATION OF STAFF FOR INCLUSION

• Policies, including Teacher Standards (2011), have made inclusion mandatory

• The only clear directive on mechanism is differentiation (TS5), which rests largely the notion of ‘ability’ or categoric labelling, so counter to inclusion

• Attitude is the major barrier to learning (“Science is hard”)

• Dangers of learned helplessness

• Salamanca statement says that teachers need repeated practice at implementing suitable adjustments to become confident and effective plus deep subject knowledge
Research case study 3: teacher training and experience of special educational needs. 

Dr Damien O’Flanagan and Dr Jane Foye (unpublished)

• End of course questionnaire for assessment, closed questions. 75% of cohort responded

• 35% of student teachers felt they were very well-prepared and 76% were VWP plus well-prepared to teach pupils with SEN. 72% said they would like more training in this area, which appears paradoxical, unless it is seen as technicist knowledge

• Very different to sector-wide data showing a lesser but rising number (from 10 to 30%) of NQTs felt very well-prepared to teach pupils in the years 2006 and 2015 (50 to 70% stating they were very well-prepared & well-prepared).

• Consistent with other work showing teachers need experience of teaching pupils with SEN before they feel they are well-prepared to teach them.
Research case study 4: What effect does policy have on pre-service teachers’ understanding and enactment of inclusion? (In preparation)

- Focus group interview of two groups of 25 just qualified science teachers at a different (city) English university about their views of inclusion.

- Inclusion was viewed as a piecemeal endeavour, with distinct interventions needed for a vast range of learner deficiencies, e.g. “There are so many groups we have to be familiar with, knowing terms beforehand helps, to know what you can do with an individual.”

- Pre-service teachers felt that inclusion interfered with content delivery.

- Differentiation was the dominant concept used when discussing inclusion.

- A utilitarian position adopted, the primary drivers being policy elements which were of immediate relevance to gaining QTS & obtaining maximum attainment outcomes for pupils.
CONCLUSION

• A narrow, elitist version of science operating in a climate of performativity
• Science teachers have good intentions about including all learners (within limits)
• Inclusion is defined in terms of mitigating curriculum demands for learning needs/deficiencies
• Differentiation is seen to be the main inclusive mechanism
• What is absent is the possibility of a radically different curriculum fulfilling different purposes
Selected references


