

## **Pre-service secondary mathematics teachers' attitudes and knowledge regarding inclusion and SEN/D**

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Teachers in the UK are required to teach a diverse range of students, with increasing inclusion of those with Special Educational Needs and Disabilities (SEN/D) in mainstream classrooms. This exploratory research investigates the initial conceptions of a Secondary Mathematics PGCE cohort regarding inclusive education of students with SEN/D, and the ways in which these developed over the course of the academic year. Many participants were willing to share their views and discuss their experiences. The preliminary findings shared here indicate a variety of initial conceptions and knowledge of SEN/D and attitudes to inclusion.

### **Teacher training; secondary mathematics: inclusion; SEN; disability**

#### **Introduction and background**

Mainstream classroom teachers are pivotal to the success of inclusive education (Forlin, Cedillo, Romero-Contreras, Fletcher, & Hernández, 2010), so it is paramount that teacher educators consider our preparation of new teachers in our respective subjects for inclusive teaching. The terms *inclusion/inclusive*, as used in this paper, refer to “the process through which education systems respond to diverse learners in ways that enable participation, equal opportunities, respect for difference and social justice. It places particular focus on the inclusion of learners with special educational needs within mainstream classrooms” (Robinson, 2017, p.164). Thus, ‘inclusion’ differs from mere ‘integration’ in that the students are not only placed physically in mainstream classrooms, but that the teaching and environment are designed to meet the additional and different educational needs found within a diverse cohort. While this paper is not the place for a full discussion of these issues, it should be noted that the terminology, concepts, educational practices and policies relating to inclusion of learners labelled ‘SEN’ and/or ‘disabled’ (as well as certain currently-popular diagnostic labels used later on) are variously interpreted, multilayered, and often highly contested (Liasidou, 2012).

#### ***Attitudes to inclusive education***

It has been found through prior research that pre-service teachers across a variety of global contexts are generally agreeable to this concept of inclusion (Avramidis & Norwich, 2002; Forlin et al., 2010), but often report lacking experience, knowledge, and understanding (Jobling & Moni, 2004) or feeling unprepared and ill-equipped (Avramidis & Norwich, 2002). In a UK context, Avramidis, Bayliss, & Burden (2000) found their participants (in-service primary and secondary teachers) lacked confidence in their ability to teach in ways that effectively met diverse student needs. These results do not indicate that teacher educators have not been taking inclusion seriously, but may reflect a suboptimal balance between theoretical and practical aspects; many pre-service teachers have reported attaining a good understanding of

educational theory relating to inclusion but less understanding of its practical applications (Hodkinson, 2005; Richards & Clough, 2004).

Recent research aimed at improving the preparation of teachers for inclusive classrooms (such as Norwich & Nash, 2011; Peebles & Mendaglio, 2014; Robinson, 2017) has provided some indications of the kinds of tasks and activities that seem effective – for example, that increased field experience working directly with ‘students with exceptional needs’ (individually or in small groups) increased pre-service teachers’ self-efficacy in this aspect (independently of prior experience).

### ***Inclusion and mathematics***

The specifics of inclusive pedagogy are likely to vary considerably between school curriculum subjects (as are the kinds of requirements and judgements made of individual capability, and the perceived barriers and enablers to participation). However, there is not as yet a great deal of prior research on teacher attitudes to inclusion that has a particular discipline focus (with mathematics no exception). Two rare examples are: Ekstam, Korhonen, Linnanmäki, & Aunio (2017), who found (Finnish, in-service) mathematics teachers to have lower self-efficacy beliefs regarding teaching mathematics to low-performing students than special education teachers; and Whitty & Clarke (2012), who found that while (Irish, in-service) mathematics teachers may have formed positive inclusive attitudes, the translation of these into practice does not always occur. It should be noted, though, that in-service teachers may have quite different conceptions of SEN/D, inclusion and subject pedagogy than postgraduate students.

Of those studies addressing the attitudes, practices and/or knowledge of pre-service teachers of mathematics regarding inclusion, many in fact look at general or special education teachers in the primary or middle-years age groups rather than subject specialists. These are, again, rather different kinds of cohort, and a great deal of the focus is thus on their mathematical subject and pedagogical knowledge and confidence. Having said this, it is relevant that Burton & Pace's (2010) study found that their (American, general education) pre-service teachers responded to increased classroom study and integrated field experience with greater self-efficacy in teaching mathematics to ‘students with disabilities’.

Better understanding, then, is needed of the ways in which secondary mathematics teachers at the start of their career conceive SEN/D, its relationship with their curriculum subject in particular, and the challenges entailed in inclusion. This paper is an initial exploration of the attitudes and knowledge regarding the inclusive education of learners with SEN/D as self-reported by a PGCE Mathematics cohort.

### **Methodology**

The participants were all on a Secondary Mathematics PGCE course on which the author teaches a few sessions. The project is currently running and in its third consecutive cohort of students; this paper focuses only on preliminary analysis of the first cohort. No personal data was collected on individual participants, but the course attracts a diverse population, with an age range of 21 up to mature students in their fifties, all currently UK citizens but with the ethnic and social diversity to be expected in Central London, and a fairly even gender mix. Prior to commencing their programme, all students had previously spent some time in school (although the level of experience varied greatly, e.g. from some observation days up to years spent working as a teaching assistant). Some had also worked as private mathematics tutors.

The dataset used here derives from a developmental reflection activity which is set as a part of the course; thus it makes use of material created for educational purposes, redeployed, with consent of participants, for research. (This ensured that no additional burden was placed on participating students.) This activity consists of three worksheets with free-text questions prompting consideration of their own attitudes toward students with SEN/D, and their experiences and knowledge regarding inclusive education so far. (The full question sets are not included here for reasons of space, but are available on request.) The first worksheet (WS1) is set near the start of the PGCE course (before first placement), the identical WS2 around halfway through it, and the more summative WS3 near the end (after second placement). All students present on the selected session dates are set the worksheets; the participation rate for 2016-17 was high (with 75-83% of the population both present on the dates and consenting for their work to be included). Note that the worksheets were anonymised and only analysed after participants had completed and/or left the programme.

The fact that the data was collected from worksheets designed for primarily educational purposes rather than research necessarily affected the content and organisation of data collected. In particular, the use of free text responses (rather than, say, multiple choice questions or Likert scales) lead to a degree of ambiguity and necessary interpretation of meaning. However, it also enables nuanced responses to complex issues. A longer publication is in preparation which will give a full methodological account. However, in brief, project data is currently being analysed qualitatively using a thematic analysis process, with repeated coding and re-coding, and the intention of minimising *a priori* categorisation as much as is reasonable. At this early stage in the project, I present selected data for illustrative purposes, and discuss the tentative themes that have been drawn so far from the Cohort 1 data; these may need to be adapted as further analysis takes place and subsequent data are added.

## Select data and initial findings

### *General attitudes to SEN/D*

Although participants were asked about SEN and disability separately, there was little difference in their conceptualisations, apart from a tendency to employ a *mental-physical* (both frequently-occurring terms) binary. It was somewhat more common for SEN to be conceptualised as predominantly ‘mental’ and disability as ‘physical’. The responses from Q1-2 in WS1-2 and Q1 in WS3 were combined to create snapshot views of the cohort’s views at the different stages.

WS1 responses were highly varied. Some participants chose formal language resembling policy documentation, e.g. “officially recognised mental or physical condition which affects someone’s ease of operating in everyday situations” or “impairment of some kind that puts an individual at a disadvantage in certain circumstances”, while others used starkly derogatory phrases such as “mental or physical abnormality” and “having a defect compared to the norm”. Although the tenor of responses varied, to generalise, there appeared to be a tendency to conceptualise SEN/D according to medical or deficit models.

WS2 responses indicated more awareness of complexities, including social aspects of SEN/D, such as that “many of these [SEN/Ds] can be exacerbated by a difficult home life, abuse, bullying and personal hardship”, with one observing that “students with SEN in my class tend to have poor attendance”. Some responses indicated a conception of SEN/D as a part of a more normalised classroom diversity,

e.g. that “different students learn concepts in different ways”. Some strong views on inclusion had also emerged, such as “exclusion is awful, inclusion has to be managed as all pupils have a right to learn”. To generalise again, there appeared something of a move in the direction of more social-aligned models of SEN/D.

In WS3, participants were asked explicitly about any changes in their understanding of SEN/D. Nineteen reported a change in understandings, and while two said “no”, this was followed by a “but” that in fact did indicate change in knowledge of specific conditions and policies. Many provided reflections that indicated they assessed themselves as having both increased knowledge, e.g. “My previous thinking was that SEND included conditions that were mainly physical rather than mental. I am now aware of far more conditions.” and more positive attitudes, e.g. “Without realising it I viewed SEN/D as entailing low attainment. I now realise this is not the case” and “Children with SEND can positively contribute to classroom discussions”. One echoed precisely a view common from the literature review: “I have the information theoretically but not seen much of it in practise [*sic*]”

### Reported knowledge of specific SEN/D

It is worth asking: when teachers in training are reflecting on the inclusion of learners with SEN/D in mathematics classrooms, which kinds of individuals and needs is it that they have in mind? In WS1-2 Q3, participants were asked the kinds of SEN/D of which they were aware. These, of course, do not provide reliable information on all the kinds of SEN/D of which participants may have known, but they do indicate which of these came the most readily to mind at the time of asking – which is also of interest. In fact, participants also referred to specific SEN/Ds in their responses to various other questions; all responses were collated to give a picture of the SEN/Ds uppermost in PGCE Mathematics teachers’ consciousness at the start and middle of the course.

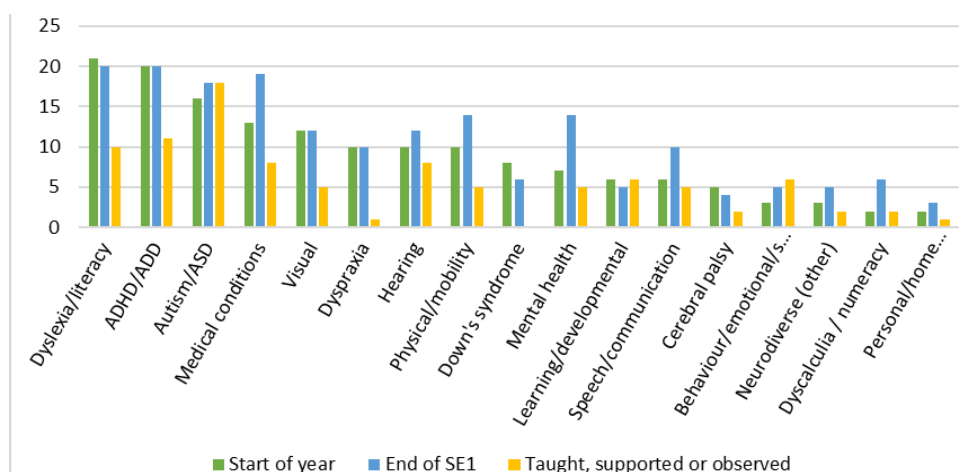


Figure 1: SEN/D terms mentioned in WS1, WS2, and mentioned as personally encountered in school

In Figure 1, the first column of each triplet is the (raw) number of mentions of a term in WS1, the second the number of mentions in WS2, and the third indicates a clear reference to actually teaching, supporting or observing students with this label while on placement. (A small amount of grouping of synonymous or similar terms has been done; however, as much as possible, participants’ own language choices are used. This is why they do not match the categorisations used in national SEN/D policy or teacher training documentation.)

As may be seen, dyslexia, ADHD and autism figured highly in participants' awareness at the start of the course, and remained so. Notable increases in mentions were in medical conditions, speech/communication and physical/mobility impairments, and dyscalculia (unsurprisingly given the curriculum subject) and, in particular, mental health conditions. Changes in the prevalence of particular items likely result from a combination of (a) encountering less familiar (or previously unknown) special education labels in both university and on their school placements, and (b) the realisation that the SEN/D umbrella includes more of the diverse conditions, characteristics or circumstances that may affect a learner's education than they had previously considered to be the case.

## Discussion

In terms of the cohort's attitudes and knowledge, the emerging themes (so far) may be considered under two broad categories: general conceptions of SEN/D (i.e. the frames of reference in which they thought about it), and particular characteristics of individuals with SEN/D (i.e. the effects of these on their learning).

### *General conceptions*

Unsurprisingly, one of the main conceptions of SEN/D was regarding *Needs* – a view grounded firmly in the professional practicalities of supporting individuals' learning. Also prominent were conceptions that referenced their *Ability/ies* (capacities, skills, etc.) or lack thereof – a view that may reflect a high importance placed on the assessment and judgment of learners' mathematics. Another kind of conception primarily concerned the *Limitations*, *Difficulties* and *Disadvantages* certain individuals may experience. (The more neutral *Differences* did also appear, but much less often.) Alongside these themes were many instances of *Norm-referencing*, i.e. defining SEN/D as a category in terms of individuals' other-ness when compared to a 'normal' learner. For example, the response “a physical **difference** that may initially **hinder** a persons [*sic*] **ability** to complete **ordinary tasks** without **support**” could be multiply-coded as referencing themes of *Difference/Limitation/Ability/Norm-referencing/Needs*.

That particular quotation is very neutral in tone in comparison to some of the much more negative conceptions mentioned previously. Variation in level of negativity also appeared elsewhere, e.g. in responses demonstrating a predominantly medical conception, which referred frequently to *Conditions* (more neutral) and less frequently *Disorders* (more negative), as well as illnesses, ailments, etc.

### *Particular characteristics*

As well as many mentions of the rather vague opposing binary terms 'physical' and 'mental', and awareness of sensory impairments, the cohort's responses indicated some knowledge of the potential of SEN/Ds to affect cognitive aspects of learning. These included: concentration, communication, literacy, numeracy, information processing, the understanding of abstract concepts (perhaps a particular concern for mathematicians), both short-term speed of work and long-term progress, and memory (in descending order of prominence). They were also aware of social, emotional and behavioural effects, and mentioned how these might affect individuals' engagement and participation.

## Future directions

These preliminary results show promise in terms of better understanding pre-service mathematics teachers' diverse attitudes and knowledge regarding inclusive education, and indicating changes during the PGCE course resulting from both university and placement experiences. More in-depth analysis, plus the addition of the two further cohorts of data, should allow for more substantial findings.

## References

- Avramidis, E., Bayliss, P., & Burden, R. (2000). A Survey into Mainstream Teachers' Attitudes Towards the Inclusion of Children with Special Educational Needs in the Ordinary School in one Local Education Authority. *Educational Psychology, 20*(2), 191–211.
- Avramidis, E., & Norwich B. (2002). Teachers attitudes towards integration - inclusion: A review of the literature. *European Journal of Special Needs Education, 17*, 129–147.
- Burton, D., & Pace, D. (2010). Preparing pre-service teachers to teach mathematics in inclusive classrooms: A three-year case study. *School Science and Mathematics, 109*(2), 108–115.
- Ekstam, U., Korhonen, J., Linnanmäki, K., & Aunio, P. (2017). Special education and subject teachers' self-perceived readiness to teach mathematics to low-performing middle school students. *Journal of Research in Special Educational Needs, 18*(1), 59–69.
- Forlin, C., Cedillo, I. G., Romero-Contreras, S., Fletcher, T., & Hernández, H. J. R. (2010). Inclusion in Mexico: Ensuring supportive attitudes by newly graduated teachers. *International Journal of Inclusive Education, 14*(7), 723–739.
- Hodkinson, A. (2005). Conceptions and misconceptions of inclusive education: A critical examination of final-year teacher trainees' knowledge and understanding of inclusion. *Research in Education, 73*(1), 15–28.
- Jobling, A., & Moni, K. B. (2004). 'I never imagined I'd have to teach these children': Providing authentic learning experiences for secondary pre-service teachers in teaching students with special needs. *Asia-Pacific Journal of Teacher Education, 32*(1), 5–22.
- Liasidou, A. (2012). *Inclusive Education, Politics and Policymaking*. London: Bloomsbury Publishing.
- Norwich, B., & Nash, T. (2011). Preparing teachers to teach children with special educational needs and disabilities: The significance of a national PGCE development and evaluation project for inclusive teacher education. *Journal of Research in Special Educational Needs, 11*(1), 2–11.
- Peebles, J. L., & Mendaglio, S. (2014). The impact of direct experience on preservice teachers' self-efficacy for teaching in inclusive classrooms. *International Journal of Inclusive Education, 18*(12), 1321–1336.
- Richards, G., & Clough, P. (2004). ITE students' attitudes to inclusion. *Research in Education, 72*(1), 77–86.
- Robinson, D. (2017). Effective inclusive teacher education for special educational needs and disabilities: Some more thoughts on the way forward. *Teaching and Teacher Education, 61*, 164–178.
- Whitty, E., & Clarke, M. (2012). Irish mathematics teachers' attitudes towards inclusion. *European Journal of Special Needs Education, 27*(2), 237–256.