"THREE CHEERS FOR DEREK HAYLOCK!" PRIMARY PGCE STUDENTS' USE OF MATHEMATICS TEACHING HANDBOOKS

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I was recently asked to review an American mathematics book intended for pre-service primary teachers, from a comparative perspective. It occurred to me that although we routinely recommend books such as Derek Haylock's 'Mathematics Explained for Primary Teachers' to our own primary PGCE students, we know very little, beyond anecdote, about how (or whether) they use such books during their training. The survey reported here was designed to find out.

INTRODUCTION

> I learned maths at school by rote. I have little or no understanding of why things are worked out in the way they are. … It's also been 20 years since I attempted fractions/equations/long division etc. In short I'm having to start again in all areas. Three cheers for Derek Haylock! (Primary PGCE student, quoted in Goulding, 2002)

The knowledge base that underpins mathematics teaching is mysterious in its content and inter-relatedness. Three of the seven categories of teacher knowledge delineated by Shulman (1986) focus on knowledge specific to the subject being taught: subject matter knowledge (SMK), pedagogical content knowledge (PCK) and curricular knowledge. Teacher educators working with beginning teachers endeavour to enable their students to acquire such knowledge, or to be aware of the relevant knowledge that they already possess (SMK in particular) through their previous learning experiences. We do this in part through our programme of lectures, seminars and workshops in the university. Yet, realising the limitations of what can be transmitted or constructed in this context, we refer our students to a range of books and journal articles that might add to their knowledge and understanding of mathematics and pedagogy.

This study was limited to Postgraduate Certificate of Education (PGCE) primary pre-service teacher education. Its purpose was to investigate *which* books the students used in their one-year course, *how much* they used them, and what they used them *for*.

METHOD

A nine-item questionnaire (shown reduced in size in Figure 1) was distributed to a cohort of about 250 Early Years (EY, pupil age 4-7), Primary (P, 7-11) and Middle Years[2] (KS2/3, 9-13) PGCE students at one university, six months into their course. 163 returns were completed, comprising 19 EY, 108 P and 36 KS2/3 trainees. It can

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[2] These students specialise in one subject, but all follow a 'primary mathematics' course focusing on Key Stage 2.

be seen that the first question was categorical, the last two are open response, and six asked for a Likert-type response on a 5-point scale.

PGCE STUDENTS' USE OF MATHEMATICS TEACHING HANDBOOKS

The aim of this survey is to find out which mathematics teaching handbooks are being used, to what extent, and for what purposes.

The PGCE mathematics handbook lists several books that you might find useful. These include:

- **Anghileri**, J. (2000) *Teaching Number Sense*, London: Continuum.
- **Askew**, M. (1998) *Teaching Primary Mathematics*, London, Hodder and Stoughton.
- **Haylock** D. (2001) *Mathematics Explained for Primary Teachers* London: Paul Chapman
- **Thompson**, I. (ed) (1997) *Teaching and learning Early Number*, Milton Keynes: Open University.
- **Suggate**, J, Davis, A. and Goulding, M. (2001, second edition) *Mathematical Knowledge for Primary Teachers*. London: David Fulton
- **Koshy**, V, Ernest, P, and Casey, R, (2000) *Mathematics for Primary Teachers*. London, Routledge.
- **Mooney**, C., Ferrie, L., Fox, S., Hansen, A. and Wrathmell, R. (2000) *Primary Mathematics: Knowledge and Understanding*, Exeter: Learning Matters.

1. Which of the above books have you **used most** during the course? [indicate ONE BOOK by underlining: if you used two books equally, just choose one of them]

Anghileri Askew Haylock Thompson Suggate Koshy Mooney OTHER

If you chose 'other', what was the other mathematics text you used most? [a hint of the name of the author or the title should be sufficient]

2. Did you BUY or BORROW the book that you chose in Question 1? [underline one]

3. To what extent did you use the book to improve your mathematics subject knowledge? [underline one]

NOT AT ALL   A LITTLE   MODERATELY   QUITE A LOT   A LOT

4. To what extent did you use the book to find out about approaches to teaching mathematics? [underline one]

NOT AT ALL   A LITTLE   MODERATELY   QUITE A LOT   A LOT

5. To what extent did you use the book to fill out and enhance the Faculty mathematics lectures and seminars? [underline one]

NOT AT ALL   A LITTLE   MODERATELY   QUITE A LOT   A LOT

6. To what extent did you use the book when writing your Core Mathematics Assignment? [underline one]

NOT AT ALL   A LITTLE   MODERATELY   QUITE A LOT   A LOT

7. To what extent did you use the book to help prepare lessons on your school-based Professional Placement? [underline one]

NOT AT ALL   A LITTLE   MODERATELY   QUITE A LOT   A LOT

8. If you used the book a lot, or quite a lot, for some purpose different from those listed in Questions 3-7, what was that different purpose?

9. Please write here any comments that you may wish to add about the use of mathematics teaching handbooks

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Figure 1: The Questionnaire

RESULTS AND DISCUSSION

The students' responses are summarised below. Space constraints necessitate only the briefest commentary on them.

The majority of students were able to identify one of the books (referred to here as 'handbooks') which they had used most (Table 1), although 14 responses (categorised as 'vague') picked out more than one book, or none.

Haylock	Anghileri	Vague	Thompson	Mooney	Other*	Askew	Koshy	Suggate
62	48	18	14	7	7	4	3	0

Table 1: Most used handbooks (N = 163)

* mainly Anne Montague-Smith (1997) *Mathematics in Nursery Education*, David Fulton

About two-thirds of the students identified Haylock[3] or Anghileri as their most-used handbook. They are strongly advised by tutors to purchase their own copy of at least one handbook, and 60% had done so. Haylock users were twice as likely to have bought the book than those who opted to use Anghileri.

Own copy (%)		
ALL	HAYLOCK	ANGHILERI
60	84	40

Table 2: Ownership of books as a percentage of those who named each book as their main resource

The tables below summarise the students' responses to the items about the *extent* to which they had referred to their most-used handbook for particular purposes. Scores 1 to 5 in the left-hand columns correspond to least-to-most extent i.e. from "not at all" to "a lot". The other integers are **percentages** of the **sample** (N =163, column 2) or the relevant **subsets** (62 Haylock users and 48 Anghileri users). Responses to Question 8 were gratifying to the extent that they indicated that the questionnaire had successfully anticipated (in items 3 to 7) how these books were used (discounting responses such as "to fill space on my shelves"). Tables 3 and 4 relate to the enhancement of SMK and PCK respectively.

for SMK	ALL	HAYLOCK	ANGHILERI
1 (not at all)	8	3	15
2	35	29	27
3	33	34	35
4	21	29	21
5 (a lot)	2	5	2
mean[4]	2.75	3.03	2.69

Table 3: Responses to Question 3

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[3] The author's surname is, of course, a shorthand reference to the book listed in the introduction to the Questionnaire.
[4] The author recognises that averaging Likert-type scores is a commonplace but questionable practice.

for PCK	ALL	HAYLOCK	ANGHILERI
1	5	8	2
2	28	31	15
3	29	32	35
4	29	26	29
5	9	3	19
mean	3.09	2.85	3.48

Table 4: Responses to Question 4

The books that have been lumped together as 'handbooks' in the questionnaire are very different in emphasis. For example, whereas Haylock addresses the teacher's own mathematical knowledge and understanding with a view to classroom application, in keeping with Ma (1999), Anghileri focuses more explicitly on arithmetic, pedagogy and relevant research, Thompson on broader pedagogical issues. The students seem to be fairly astute in recognising these different emphases in the ways that they use them.

Table 5 shows the extent to which students use the handbooks to 'read around' and fill out the content of their PGCE sessions in the university.

For enhancement	ALL	HAYLOCK	ANGHILERI
1	27	24	25
2	33	31	33
3	23	23	25
4	13	19	13
5	3	3	4
mean	2.31	2.47	2.38

Table 5: Responses to Question 5

This suggests that recourse to the books for course enhancement is, at best, modest. Some respondents to Question 9 indicated that they don't have the time for such activities, or that they expect to find it more useful in their first teaching post.

For the PGCE course assignment, students are required to describe and analyse a mathematics lesson that they taught. Knowledge of relevant literature is valuable for the analysis, and students are expected to refer to it in their essays. Table 6 shows the extent to which they used handbooks such as these for this purpose.

Course assignment	ALL	HAYLOCK	ANGHILERI
1	7	11	0
2	13	18	4
3	24	29	21
4	37	31	48
5	18	11	27
mean	3.45	3.13	3.98

Table 6: Responses to Question 6

These responses suggest that the assessment requirements of the assignment motivate a number of trainees towards more intensive use of these handbooks. Anghileri, in particular, is perceived to be a relevant, scholarly resource for citation in the essay.

Table 7 concerns the students' use of these handbooks in preparing lessons during the school-based placements that account for half of the PGCE year.

Lesson preparation	ALL	HAYLOCK	ANGHILERI
1	50	45	54
2	29	29	23
3	14	15	21
4	4	6	2
5	2	5	0
mean	1.78	1.97	1.71

Table 7: Responses to Question 7

These responses might be thought to be disappointing when compared with those in Table 6. Haylock, Anghileri and the other texts are rich resources of what I and my colleagues have called knowledge for 'foundation' and 'transformation' (e.g. Rowland, Huckstep and Thwaites, 2003) in preparation for teaching. The existence of ready-made online 'unit plans' (http://www.standards.dfes.gov.uk/numeracy/unit_plans/) may account for the lack of recourse to more fundamental sources of information and inspiration.

Finally, some quotations from the open responses to Question 9 shed further light on the quantitative data. The respondent's PGCE age-phase and most-used handbook is given with of each quotation. The first two comments reflect the time and information overload experienced by many PGCE students:

No time to read any … [P, Thompson]

I think a handbook will be useful when I am a qualified teacher … with so much information being thrown at one [on the PGCE] another handbook isn't useful. [P, Mark Patmore, *How to pass the numeracy skills test*[5]]

A few, however, seem to have made time to read and be able to comment on several of the handbooks:

Of the recommended texts, I found Anghileri very accessible and informative, as were Thompson and Suggate for the assignment. Askew was informative for ideas relating to teaching various topics [KS2/3, Haylock]

Haylock is very good on subject knowledge (especially as a reminder for mature students). Anghileri is brilliant on counting/number, as is Thompson. I also bought Mooney, but found it less helpful [EY, Haylock]

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[5] This text was not among those specifically recommended for the course.

Others were quite open about initially instrumental incentives:

I bought the book for the assignment [KS2/3, Askew]

Contrasting comments indicate the importance of sampling before buying, and that individual preferences inevitably differ:

I read all the Haylock book and found it very useful … [KS2/3, Haylock]

I bought Haylock … but actually it wasn't that useful. [KS2, Haylock]

I found Haylock extremely helpful and regret buying Koshy … [KS2/3, Haylock]

Finally, a heart-warming antidote from an EY student to the commonplace complaint that university PGCE sessions are not sufficiently 'practical':

There should be more emphasis on the type of content these books contain during seminars/lectures and less time wasted on undertaking activities - give us the theory so we can learn to apply it! [EY, Montague-Smith]

CONCLUSION

The findings of this survey suggest that, for a significant number of primary PGCE students, mathematics teaching handbooks such as Haylock and Anghileri become a significant resource for a variety of purposes during initial teacher training. At one extreme, represented by the student quoted at the beginning of this paper, they represent a lifeline. Others dip into them occasionally to enhance their SMK and PCK, and most students recognise that they need them when it comes to assignment essay writing. These books are perhaps neglected during school-based placements, although some students believe that they will be more beneficial once they are in their first teaching post. The challenge might be for PGCE tutors to integrate their use more thoroughly, yet more realistically, into the courses that they provide for beginning teachers, and for school-based induction tutors to give explicit encouragement to newly-qualified teachers to use them as a resource for teaching and a means towards professional autonomy.

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