

TALKING POINT:

WHAT MAKES FOR EFFECTIVE CONTINUING PROFESSIONAL DEVELOPMENT (CPD) IN MATHEMATICS TEACHING?

IN SUMMARY

- Effective maths teacher CPD, like teaching, is complex
- More research is needed on impact as well as teacher satisfaction with CPD
- CPD can take a variety of forms – not just face-to-face – and can be informal or formal
- Effective CPD should be based on participants’ needs and goals and teachers should have enough time to engage with, reflect on and embed the CPD
- Long-term, teacher-driven CPD, such as lesson study, mentoring, and teacher research (developing learning communities) can be effective
- Important features of effective CPD for maths teachers include a practical focus, time to reflect and opportunities for networking
- Some features appear critical: one possible set of critical features for effective maths teacher CPD are: content focus, active learning, coherence, duration, and collective participation
- CPD that is subject-specific and considers how pupils makes sense of mathematics is considered valuable by maths teachers

Perceived importance of incidental conversations for 92 mathematics teachers at teacher network meetings



Very important Important Not very important Not important Not applicable

Source: RECME project, 2016

1

Continuing professional development (CPD) for teachers of mathematics is an ‘essential intellectual and emotional endeavour’ but it is as complex as (because it mirrors) teaching itself¹. It can be constructed at the teacher or school level, as an individual or collaborative process, or as a political or institutional move to align with curricula or different political reform². Recent research recognises the interplay between individual teachers and structural features of their communities of support as important for effective CPD³. There is a wide variety of characteristics of effective maths CPD and the research evidence can be ‘inconsistent and sometimes contradictory’⁴ – only recently has the need for more ‘empirically valid’ research on impact rather than attitudes been suggested and some conceptual consensus reached⁷. There has been a call for ‘improved measures and methods for studying the effect of PD on teachers and students’⁶. Additionally, it is rare to find research in the area that is not conducted by stakeholders⁵.

IMPLICATIONS: Effective CPD for maths teachers is important but complex

CPD is a term for a variety of different activities by different agents for different purposes

More research is needed on impact and results in this area

‘Views of professional development for teachers vary very widely. Some see it as everything a learning experience should not be.’

Guskey

‘At some schools – mine included – no time or money is allocated to subject-specific learning. Since my NQT year, I haven’t received any training that’s actually had an impact on my teaching’

Jo Morgan, 2015

2

Most maths teacher CPD takes place face-to-face^{5,6} but online, distance or blended formats are widely available (eg Open University or Stanford modules, MOOCs, Bowland Maths PD modules); although learning via these formats may contribute more towards *informing* and *influencing* than *embedding* and *transforming*¹⁰. CPD activities that are incidental or informal can also have value (see infographic); powerful 'learning communities' can be both formal or informal⁸. There is a suggestion that job-embedded, longer term, teacher-driven *content-embedded* CPD is effective: examples might include lesson study, mentoring, teacher research – all of which appear to be increasing in occurrence over time⁶.

IMPLICATIONS: Effective maths teacher CPD can take a variety of formats – but there is some evidence that face-to-face is more transformative than other formats

Opportunities for informal or incidental CPD can be valuable

There has been a move towards lesson study, mentoring and teacher research as examples of effective long-term, teacher-driven CPD

3

There is a considerable body of research related to maths teacher CPD, but it is lacking in a systematic empirical approach to consider effectiveness – regarding both improvements in instructional quality and student outcomes^{7, 8}. Often, studies report effects on teacher attitudes or satisfaction rather than impact on results or processes⁹. Some of the factors which maths teachers reported as features of effective CPD in one large study are a practical focus, time to focus and reflect on practice⁵, opportunities for networking with colleagues, focus on mathematics and ways of teaching it⁷ and/or cycles of planning teaching, predicting student responses, and considering how pupils make sense of mathematics¹⁰. Teachers also reported that CPD was effective because it gave them confidence, passion and energy to develop and change their classroom practice,⁷ giving them 'permission' to try new things¹¹. Good leadership in school and out of it is reported as key to effective professional development for maths teachers⁸.

IMPLICATIONS: Although this is not the same as measuring results, maths teachers consider a practical focus, time to reflect and opportunities for networking as important for effective CPD

Maths teachers also value CPD that is subject-specific and includes how pupils makes sense of mathematics

4

A core conceptual framework has been proposed (Desimone) which suggests focusing on critical features rather than form(at), suggesting there is a reasonable degree of consensus in the research⁶ as to five of these: *content focus*, *active learning* (not just listening) *coherence* (with teacher knowledge/beliefs and across a school), *duration* (must be 'sufficient'), and *collective participation*⁸. Effective CPD should include 'sustained experiences for an extended period of time' and be based on participants' needs and goals^{7,12}. Other focused reviews have recommended attention to student thinking and use of video as effective practice in maths CPD but emphasised that CPD is likely to have varied impact for different teachers at different career stages¹³.

IMPLICATIONS: Effective CPD should be based on participants' needs, goals and career stage

Use of video and paying close attention to student thinking can be particularly effective

There is a consensus that critical features of effective maths teacher CPD include a content focus, active learning, coherence, duration, and collective participation

Participants should have enough time to engage with, reflect on and embed the CPD

Lucy Rycroft-Smith, 2018

REFERENCES

- Guskey, T., Foreword, in Day, C. and Sachs, J. (2005) *International Handbook On The Continuing Professional Development Of Teachers*, Open University Press
- Han, X., & Wang, H. (2010) Mathematics Teachers' Professional Development Opportunities in the Curriculum Reform of China, *Research in Comparative and International Education*, 3:4, 421–433
- Franke, M., Carpenter, T., Levi, L., Fennema, E. (2001) Capturing Teachers' Generative Change: A Follow-Up Study of Professional Development in Mathematics, *American Educational Research Journal*, 38:3, 653–689
- Guskey, T. (2003) What Makes Professional Development Effective? American Educational Research Association: Chicago
- Joubert, M., Back, J., De Geest, E., Hirst, C. & Sutherland, R., (2010) The Researching Effective CPD in Mathematics (RECME) research project
- RoeskenWinter, B., Schüler, S., Stahnke, R., & Blömeke, S. (2014) Effective CPD on a large scale: examining the development of multipliers, *ZDM Mathematics Education*, 47:13–25
- Mayer-Packenham, P., Bolyard, J., Oh, H. & Cerar, N (2010) Common features of professional development activities for mathematics and science teachers, *Professional Development in Education*, 37:4, 571–589
- Desimone, L. (2009) Improving Impact Studies of Teachers' Professional Development: Toward Better Conceptualizations and Measures, *Educational Researcher*, 38:3, 181–199
- Back, J., Hirst, C., De Geest, E., Joubert, M., & Sutherland, R. (2009), *Final report: researching effective CPD in mathematics education (RECME)*, NCETM
- ACME, Advisory Committee on Mathematics Education (2013) *Empowering teachers: success for learners*, London: ACME
- Shriki, A., Lavy, I., (2012) Perceptions of Israeli mathematics teachers regarding their professional development needs, *Professional Development in Education*, 38:3, 411–433
- Goldsmith, L., Doerr, H. & Lewis, C. (2013) Mathematics teachers' learning: a conceptual framework and synthesis of research, *Journal of Math Teacher Education*, 17:5, 5–36
- Harris, G., Stevens, T., & Higgins, R., (2011) A professional development model for middle school teachers on mathematics, *International Journal of Mathematics Education in Science and Technology*, 42:7, 951–961