

Grace Grima (Pearson UK), Jennie Golding (University College London IOE), Benjamin Redmond (Pearson UK)

Theme: formative assessment

Journeys of self- and peer-assessment in a reformed mathematics curriculum: primary school children's accounts of the roles of explanation, reflection and challenge

The 2014 primary curriculum in England has an ambitious focus on genuine mathematical problem-solving, reasoning and communication. Such aspirations have previously proved intractable. We draw on primary school children's voice from a longitudinal (2019-2022) classroom-close study of the use and impact of one set of teacher-educative curriculum materials, 'Power Maths', to show how reformed pedagogical devices and deliberate, semi-structured and probing class discussion, if used consistently, can support children's peer- and self-assessment for curriculum intentions and the development of productive mathematics dispositions.

Visits to year 2, 4 and 6 classes (age 6/7, 8/9 and 10/11) gave access to children's views on their 'new normal' post-pandemic practices/views?. We focus on responses to two Power Maths devices, 'Reflect' and 'Challenge', and also sample children's analysis of the reformed role of in-class mathematical explanations. We show children were keen and able to articulate the learning potential, as well as inherent demand, of such approaches – and that almost all embraced that/them?. In two schools where teachers had invested heavily in knowing the linked teacher-educative support materials, the quality of children's mathematical communication was exceptional. We suggest that well-structured curriculum resources supporting active learner self- and peer-assessment can promote achievement of aspirational curriculum intentions.

Journeys of self- and peer-assessment in a reformed mathematics curriculum: primary children's accounts of the roles of explanation, reflection and challenge

In this presentation we explore the roles of children's self- and peer-assessment in achieving reformed mathematics curriculum intentions with the support of 'Power Maths' materials; we

draw on primary school children's voice from a longitudinal (2019-2022) classroom-close study of Power Maths use and impact on learning.

The 2014 primary curriculum in England has an ambitious focus on genuine mathematical problem-solving, reasoning and communication. Such aspirations have previously proved intractable (Ofsted, 2012). Schmidt & Prawat (2006) argue that a deep-seated coherence of all aspects of the curriculum system (including intended curriculum, teacher capacity, curriculum materials, and assessment) is needed if curriculum reform aspirations are to be met. Curriculum-aligned teacher-educative (Davis & Krajcik, 2005) materials support the first three of those; here we explore whether they might also contribute to the fourth, at least in its formative aspects.

Black and Wiliam (2004) identify key features of classroom formative assessment as

- Classroom tasks, dialogue and deliberate structured questioning that are planned in ways that advance the learning goals;
- Children encouraged to self-assess, and to use peers for peer assessment and support;
- Teacher feedback that is qualitative, and focused on moving forward in the light of assessed learning needs, rather than being summative and judgmental;
- Children supported to be constructively critical about their arguments/solutions (as a particular aspect of self-assessment).

Hodgen and Wiliam (2006) operationalise these for mathematics, in ways which are entirely coherent with Power Maths materials. Power Maths promotes pedagogical approaches that include:

- a whole-class introduction that probes prior learning with justifications, with children responding in whole sentences, **explaining their thinking**, and demonstrating on the board;
- **Explain-to-peer** and peer support expected during independent work;
- Written questions using '**explain boxes**', and children's comparison and critique of series characters' competing approaches or errors;
- '**Reflect**' tasks for whole-class use, supporting a lesson-synoptic grasp;
- '**Challenge**' near-end-of-lesson tasks that dig deeper with target learning.

These approaches clearly have the potential to expose and enhance children's mathematical thinking, through both oral and written articulation; Power Maths explicitly supports teacher

capacity to harness, and build on, the learning so exposed. There is still comparatively little evidence around the impact of textual materials on formative assessment, or on student mathematical functioning or affect - and (especially younger) children's voices in the field, as in our presentation, are unusual.

Our Power Maths study was designed to be 'classroom-close' (Golding et al., 2023), with termly interactions with teachers, and intensive school visits that, except during the main pandemic period, observed whole lessons and then probed children's and teachers' related reflections through focus groups and interviews, respectively. Our 2021-22 visits to year 2, 4 and 6 classes (age 6/7, 8/9 and 10/11) gave access to focus group children's views on their 'new normal' in mathematics post-pandemic.

In this presentation we analyse responses to two Power Maths devices, 'Reflect' and 'Challenge', and also exemplify sample children's analysis of the reformed role of in-class mathematical explanations when teachers are using Power Maths-promoted approaches. Through the use of children's voice and observation data we show children were keen and able to articulate the learning potential, as well as inherent demand, of such devices and approaches – and that almost all sample children embraced that demand. In two schools where teachers had invested heavily in knowing the linked teacher-educative support materials, observations showed the quality of children's mathematical communication, with teachers and peers, as well as written, was exceptional.

These findings are remarkable for their timing – as schools were emerging from significant pandemic-related disruption - and are testament to the potential of the pedagogical structures used, as well as to the sophistication of these 6-11 year olds' mathematical reflection. They show how reformed pedagogical devices such as 'Reflect' and 'Challenge' and deliberate, semi-structured and probing explanations, if developed consistently with adequate resources?, can support primary children's peer- and self-assessment for reformed curriculum intentions, and their development of productive mathematics dispositions.

References

Black, P., Harrison, C., Lee, C., Marshall, B. & Wiliam, D. (2004). Working Inside the Black Box: Assessment for Learning in the Classroom. *Phi Delta Kappan* 86/1, 9-21.

- Davis, E.A. & Krajcik, J.S. (2005). Designing educative curriculum materials to promote teacher learning. *Educational Researcher* 34/3, 3-14.
- Hodgen, J. & Wiliam, D. (2006). *Mathematics Inside the Black Box: Assessment for Learning in the Mathematics Classroom*. King's College London.
- Ofsted (2012). *Making mathematics count*. HMSO, London.
- Schmidt, W. & Prawat, R. (2006). Curriculum coherence and national control of education: Issue or non-issue? *Journal of Curriculum Studies* 38/6, 641–658.