

# Subject professional association activity: what can it offer teachers of mathematics and their students?

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*Professional association activity is commonly regarded as a professional ‘good’, yet there remains little systematic evidence of its impact. This paper reports on a small study that asked English teachers of mathematics participating in such activity what contribution they believe it makes to the development of their knowledge, skills and affect, and how that then impacts on their students. Participants claimed a range of significant and pervasive benefits, many of which are distinctive to this form of professional development. These include a renewed commitment to their role as teachers of mathematics, refreshment and inspiration, and a deep and lasting impact on both their own learning and that of their students.*

**Keywords:** *Professional association, professional development, mathematics, affect.*

## Background

Within mathematics education in the UK, there are four national ‘classroom-facing’ PAs, funded entirely from membership and each attracting up to several thousand members: The Mathematical Association (MA), the Association of Teachers of Mathematics (ATM), the National Association for Numeracy and Mathematics in Colleges (NANAMIC), and NAMA, the National Association for Mathematics Advisers. All have a core purpose of supporting the teaching and learning of pre-university mathematics through working with teachers and others.

Their annual conferences, residential for most, offer sessions that might focus on mathematics pedagogic knowledge or skills, learner enrichment or teachers’ own mathematics enhancement and/or enjoyment, or mathematics curriculum, leadership or assessment issues. There is time for networking and also for social activities. Conferences are usually held in teachers’ holidays and teachers who attend often fund themselves, so they clearly value what such activity offers. Between them the PAs also offer a range of day conferences, bespoke courses, professional periodicals, local groups, policy debate, and a variety of social media opportunities, so building professional communities of up to national scale. Additionally, the larger ones operate working days and weekends when resources are developed for publication, and Hodgen (2003) suggests this in itself can develop teacher reflection, knowledge and hence practice. Teachers can therefore personalize the extent and type of their involvement and the professional development (PD) targeted.

I adopt Cobb and Bowers’ (1999) conceptualization of teacher PD as any planned experience intended to develop teachers’ professional functioning (for the ultimate benefit of their students’ learning) – and that process as both enculturation and construction. We know something of what makes PD effective, for example that it has a content focus, is coherent with teacher’s prior learning and needs, active, sustained, features collective participation (e.g. Desimone, 2009). Golding (2017) suggests that for sustained development it should develop positive work-related identity and affect, as in Hodgen (2003) and Hannula (2011) respectively, including self-efficacy, resilience,

enthusiasm and feeling valued. The importance of effective PD, job satisfaction and recognition to teacher retention is also well evidenced (Lynch et al, 2016): critical when, as in England, there is a shortage of effective teachers of mathematics at all levels (Ofsted, 2012).

There are, though, some sizeable gaps in the PD literature, e.g. there is limited evidence of the impact on students' learning (Joubert and Sutherland, 2008), and the affordances of online activity continue to change. Further, I can find no systematic study of the contribution professional association (PA) activity can make to teachers' development, though Chetwin (2010) suggests there are likely to be gains from networking, growth of knowledge and/or skills, and taking responsibility for one's development. This small study therefore investigated the contribution of PA activity as perceived by participant English teachers of mathematics (n=185). It asked

- How is PA activity aligned with what is known about effective PD?
- What contribution can PA activity make to teachers' professional development, and to the development of their students?
- Is any of that distinctive?

## **The study**

I conducted semi-structured individual interviews with a purposive sample of four anonymized participants from each of the four 2016 PA annual conferences (Table 1), drawing on a variety of phase/experience/PA background from those currently, or recently, active in the profession. Questions (Figure 1) offered opportunity for development of a grounded account (Charmaz, 2006).

All 2016 conference participants were invited to complete a (usually online) questionnaire designed in part to validate interview responses with a wider sample. The interview questions were complemented by Likert-style questions (Table 2) designed to elicit the value attributed to aspects of conference activity known to be particular to this form of PD. Additionally, I scrutinised documents and publications available on PA websites or at conferences. Data consisted of questionnaire responses (n=185), transcriptions of recorded interviews (n=16), and my notes from documents scrutinized. There is no claim to generalisation from this highly selective sample, though the study shows clearly the breadth and depth of perceived impact on some teachers.

Grounded analysis of all qualitative data was by open, axial and selective coding (Charmaz, 2006). Documentary evidence was used to validate participant claims, and interviewees validated all written interpretations of their talk; additionally, a colleague acted as a 'critical friend' - particularly important given I have a history of involvement in PA activity myself.

Throughout, though, the study is framed by its reliance on teacher accounts. The status of such claims has been contested: do teacher narratives represent warranted true belief, and if not, to what extent can they be represented as 'truth'? This issue is addressed in the literature, though Desimone (2009) argues concerns can be over-stated in relation to accounts of PD; I adopt here Doyle's (1997) position applied to teacher development, that the study aims to develop understanding of a highly contextualised and personal phenomenon, through access to participants' stories of intentions, motives, purposes and perceptions of effectiveness, rather than a universally knowable phenomenon susceptible to legislation through policy.

**Table 1: Interviewees**

Source	Pseudonym and teaching context	PA activity(years)
ATM	Alice (11-18, special education), Lara (11-18), Terry (11-18), Billy (11-18, Higher Education, Adviser)	6/8/ 2/'many'
MA	Jackie (5-11, 11-18, Higher Education), Janet (5-11, Adviser), Kim (11-18), Rachel (5-11)	41/35/3/10
NAMA	Charles (11-18, Higher Education), Gail (5-11, Higher Education), Graham (11-18, Adviser), Kathy (11-18)	16/20/16/'many'
NANAMIC	Sally (11-18, 16+), David (11-18, adults), Angela (16+), Susan (11-18, 16+)	'Many'/0/'12/10

1. Tell me about your professional background... and your history of involvement in (*the PA*).
2. What aspects of the conference are you finding/did you find particularly helpful (why)?
3. What are the limitations of a conference like this in terms of your PD – what aspects of your PD are better provided elsewhere? (*prompt*: institution or local opportunities, online affordances)
4. And how do all these different opportunities impact on your students? (*prompt*: and their learning? How do you know? Any conference-specific impact, or not? if not mentioned)
5. So if someone asked you how you stay up to date, maintain your skills, and develop further as a teacher, what would you say?... and has that changed over your career?
6. Any other comments you'd like to make about your PD and its relation to PA activity? Thanks.

**Figure 1: Interview structure**

## Findings

Coding exposed themes around identity and values, specific gains for teachers and/or students, strengths and limitations of professional association activity, including some apparently distinctive benefits, and threats or disincentives to that. I consider each of those in turn. Whilst it was not possible to enact either questionnaires or interviews in precisely comparable ways across the four associations, I argue that differences did not fundamentally influence the nature of responses.

### Identity and values

Interviewees were keen to talk about impact on their professional identity or values, often in terms of affirmation, empowerment and meeting with like-minded people who support and challenge them professionally. For 11 of 16 this was their first focus in response, often centred around face to face participation – a sense of community, sometimes built up over years, and talk about refreshment and renewal, often contrasting that with the draining nature of teaching. Claims were often extravagant: “It’s been a life-changer, it builds me up as a maths teacher so I can do a better job in the classroom” (Kim), and for four teachers this was specifically linked with retention:

PA activity helps me analyse and then be proactive about developing what I value. Hugely empowering, and ... that keeps me in the profession despite the grinding demands. (Lara)

Here is about personal PD, affirmation, values – challenge too, but support for...your long-term growth and enablement, that enables you to go back refreshed and keeps you committed to what can be a ...very draining profession – I just couldn't stay in my job long-term without that injection of positivity and recharging. (Billy)

For interviewees with a background in Further or Adult Education, this identity work was talked about in even more fundamental terms:

In FE, very often you don't even see other teachers of maths... So NANAMIC gives you that identity – there are other people out there struggling with you, valuing some of the same things as you do – otherwise you're just functioning in isolation, far too often. (Sally)

### **Specific gains for teachers and/or students**

Interviewees commonly (10 of 16) talked about the high quality of PA publications, sessions and resources in terms of direct benefit to themselves and to their students:

Support – inspiration - resources: I return brimming over with ideas and enthusiasm, with knowledge about innovations across the country, catholic ideas and approaches that have worked in different circumstances. The resources are creative and engaging, they really probe deep understanding and the students love them. (Terry)

Often the benefit was claimed to spread beyond the interviewee concerned:

I've worked with teachers using these materials and boy are they effective. If they can make the right selection and the right tweaks, and we work on that, then they see real and immediate impact on learning. (Graham)

Many respondents (25 open questionnaire responses and 7 interviewees) greatly valued informal networking opportunities, claiming explicit benefits also to their colleagues and students – both immediate and also for sustained learning and positive disposition towards mathematics:

The specific numeracy ideas, I took them straight back to my classroom and my students are already showing the benefits, in a couple of weeks – to confidence as well as skill. There are also 'seed' ideas, things that ...will come to fruition over a longer timescale. (Susan)

For some (seven interviewees and over 25 open questionnaire responses), the opportunity to be better informed about, and contribute to, national policy debate is valued; for others (in 6 interviews and some 15 questionnaires), the chance to engage with cutting-edge research relevant to their practice and reflect on its application is important. Teachers who engage in local branch meetings claim similar, but less extravagant, benefits. Questionnaire open responses were generally consistent with these interview response strands.

### **Strengths and limitations of PA activity**

As well as the specific benefits to professional skills and knowledge, and to professional affect and identity, teachers identified the eclectic nature of professional association activity, and the fact that

they can easily personalise it to their own professional needs, as underpinning its effectiveness. Many described it as ‘uniformly high quality – the best professional development I get’ or similar. It was often reported as having long-term benefits for both teachers and their students, sometimes in contrast to other courses which “focus on short-term skill or particular knowledge.” (Janet).

Five interviewees talked about the benefits of being physically removed from their work environment and the luxury of sustained unhindered time committed to their professional growth. Several teachers described the desirability of also participating in institution-based development alongside colleagues, with access to familiar resources, and with whom they could contextualise new ideas. In three interviews they extolled the particular advantages of engaging in branch or conference activity with at least one colleague. On the other hand, teachers said they found distance learning can be effective and efficient for pure dissemination of information. Four identified PA activity as often limited by a ‘light touch’ for more substantial knowledge or skill development, particularly where there was a need for substantial subject or subject pedagogical knowledge, perhaps better provided in a series of inputs interspersed by classroom embedding. This was true in particular for two of the one-day NANAMIC conference participants. One commented:

And of course then you go back into college and there’s no-one to share it with...so unless you’re really committed, those interesting ideas and good intentions might well get lost. (Angela)

However, all of those interviewed and virtually all of those completing questionnaires identified face to face PA activity as a central and rich component of their effective impact on students. These comments were echoed in questionnaire responses, though typically in less depth. Questionnaire responses added no significantly different responses.

Likert scale items in questionnaires largely concentrated on features of conferences. Table 2 shows mean response, on a scale of 1 (of little importance to me) to 5 (very important to me), together with standard deviations *s*. As quantitative data it is of limited robustness but gives some indication of the ranking of different aspects, similar but not identical for the different conferences. For the range of participants, working with others from a variety of roles and experiences is highly valued, as are opportunities to engage with new ideas or mathematics. These teachers also value opportunities to construct a programme that meets their individual needs.

**Table 2: How important are the following aspects of the conference to you?**

*Association (responses from active teachers or those actively working with teachers)*      *NANAMIC (n=10)*      *NAMA (n=29)*      *MA (n=56)*      *ATM (n=90)*      **Overall (185)**

	<i>NANAMIC (n=10)</i>	<i>NAMA (n=29)</i>	<i>MA (n=56)</i>	<i>ATM (n=90)</i>	<b>Overall (185)</b>
Meeting people in comparable roles	4.2	3.7	4.3	4.2	4.2 (s=0.7)
Face to face rather than at a distance	4.4	4.5	4.3	4.3	4.4 (s=0.7)
Meeting people from other phases in education or with different roles or from different areas of the country	4.2	3.9	4.7	4.7	4.6 (s=0.6)
A mix of beginners and experienced colleagues	4.4	4.0	4.5	4.6	4.5 (s=0.7)

Sessions that are grounded in the classroom	4.1	3.4	4.4	4.2	4.1 (s=0.5)
Social activities	-	2.3	3.3	3.9	3.5 (s=1.1)
Immersion – it’s residential	-	2.3	4.5	4.3	4.0 (s=0.7)
Opportunity to do mathematics or engage with new ideas, irrespective of whether I’ll use them directly in the classroom	4.3	4.5	4.5	4.6	4.5 (s=0.8)
Being able to choose sessions which fit my needs/preferences	4.6	3.7	4.6	4.7	4.5 (s=0.8)

### Threats or disincentives to such activity

There are, though, some clear threats to participation, of which funding was mentioned by nearly all interviewees. Although “cheaper for several days of exceptionally high quality development than many mediocre commercial courses” (Rachel), teachers routinely talked of schools and colleges prioritising performance-framed one-off courses for funding, and leadership teams not valuing the “deeper, wider learning that is supported by face to face PA opportunities” (Janet). Others said that colleagues “thought they were mad to spend holiday time at a ...conference when there are so many pressures during term time you just want to curl up and die when you get to a holiday” (Kathy). Four interviewees claimed their schools/colleges would not pay for conference attendance because a better-informed teacher was more likely to move. Funding was a particular issue for those working in FE, with a majority of those respondents reporting little or no employer support for subject-specific development, so no choice but to fund such development themselves.

Four interviewees suggested that Primary or FE teachers without a strong mathematical background or a specific mathematics responsibility were unlikely to prioritise, or be confident to participate in, subject specific and self-funded professional development. They suggested incentives for Primary teachers to ‘bring a local friend’ might increase both confidence and impact, and identified day conferences as a good first step “where it’s often desperately needed” (Janet).

### Discussion

It is important to note that there is no claim to generalisability here: these are teachers in an English education culture who choose to attend these conferences in their own time, and often self-funded. They are therefore highly committed to their own development as teachers, but also claim that they gain motivation and energy for their work from PA activity, often in contrast to other opportunities available to their context. It is striking that almost all interviewees privilege talk about values, affirmation of professional identity, and improved self-efficacy in their accounts, together with deep, wide and reflective mathematical (subject and subject pedagogical) learning for the long-term effective exercise of their professional role. They commonly contrast that with much external PD and often generic local provision. With both preservice and inservice education in England increasingly adopting generic rather than subject-specific approaches, Joubert and Sutherland (2008) show such subject-specific opportunities are central to the development of a deeply effective teaching profession.

The benefits described align well with Desimone's (2009) and Golding's (2017) criteria for effective PD: showing a clear content focus, active and coherent with teacher's prior learning needs, featuring collective participation, and contributing very positively to teachers' affective and identity needs. PA activity can be sustained (sometimes over years) in the sense of offering longitudinal stimulus interspersed with everyday teaching, but not usually in the sense of a critical mass of hours focused on particular knowledge or skills, for which other avenues would appear to be more effective. The benefits claimed for teachers, and for their students, are significant, deep, wide-reaching and long-lasting, including a renewed commitment to retention in the profession. There is no *a priori* reason why such benefits should not be experienced by far greater numbers, and it is important that perceived threats to participation are addressed. These are not just about funding, but, as in Lynch et al (2016), about the value teachers perceive management to give to PA activity and to teachers' PD beyond the short term specific needs of their school/college.

All teachers in this study were teachers of mathematics, but in the English context there are comparable professional associations in other curriculum areas, and an obvious question is whether the benefits cited here, particularly in relation to subject-related identity, apply also to them.

### **Benefits distinctive to professional association activity**

Some distinctive benefits of PA activity appear to emerge. First, there is the opportunity to mould a PD programme to one's own professional needs, whether in terms of reading, resources or face to face development. Many teachers also referred explicitly to working with mathematics – for its own sake as well as for possible classroom benefits. In England, in contrast to many other jurisdictions, this is unusual after initial qualification, yet this aspect of PA activity was commonly highly valued.

There appears to be a great deal of professional affirmation, networking and identity work taking place. Some teachers particularly value the access to recent research offered by the PAs, and/or the informed policy work facilitated by PAs and based on professional discussion, and I would argue it is healthy for policy systems to be informed by such knowledge and discussion. Finally, through the PAs it is relatively easy for teachers to be able to offer something back to the PD of others, whether through writing about their professional work, giving a session at a conference, disseminating, receiving critique and discussing in a varied but informed peer group, producing resources or developing courses, or engaging in writing work that responds to deep desires to improve mathematics learning. This is itself is recognized to be developmental:

Writing for journals has been very developmental, and the support you get for doing that. Very high quality writing sessions: a richness of ideas from people whose ideas have since shaped my practice, that I admire and aspire to. (Charles)

There are, though, other providers of different subsets of the cited activities, and it is an open question how the affordances and constraints of such provisions compare with those of PA activity.

## **Conclusions**

These English mathematics teachers claim a wide range of benefits from PA activity (especially face to face events), some of which are perceived as either exclusive to such activity or most effectively provided by it. They say it gives them deep and wide professional learning which

impacts on their students both through specific pedagogical tools and approaches, and through teacher refreshment and re-commitment. They claim an affirmation of their professional identity through sharing goals and values with others, and increased self-efficacy through peer validation and personalisation of development. Teachers value the subject-specific nature of PA activity, that in the English context contrasts with much school-based, typically generic, development. They appreciate the range of ideas and ways of thinking that far exceed what is available within one school/college or group of institutions. For many, these claimed benefits have been developed and sustained over years.

The study offers evidence to management and policy makers about the value these teachers of mathematics place on subject-specific development that affirms their professional identity and their values, recharges and renews their commitment and enthusiasm, and engages them actively in deep and reflective subject and subject pedagogic learning. With current performance pressures and limited budgets, it is not surprising English schools and colleges often privilege perceived immediate curriculum needs, but the cost of PA activity outside teaching time is small when compared with the costs to students of a stale and drained teacher – or no teacher at all. There is a need to identify politically-acceptable ways to invest in teachers' longer term subject-specific development, so that more teachers are encouraged to participate in such activity.

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