

The impact, in teachers' own words, of sustained mathematics professional development 18-months on – findings from a large-scale survey

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Mathematics in Education and Industry

During the Summer term of 2023, an extensive online survey was sent to 868 secondary school teachers who had completed an Advanced Mathematics Support Programme (AMSP) sustained professional development course in 2021-22, to understand any impact it may have had 18-months on. This paper details the survey creation, which included a collection of specific open-ended questions, as well as some benchmarking question sets. It discusses the feedback from 190 teachers who completed the survey. Impact on teacher's own classroom practice, on their students and their wider department/school is reflected upon. Aspects of Ofsted's 2023 independent review of teachers' professional development in schools report are considered alongside the responses from mathematics teachers who completed the AMSP survey.

Keywords: Professional development; survey; A level; subject knowledge

Introduction

Professional development (PD) is important for teachers to enable delivery of a high-quality education system (Ofsted, 2023, p. 1). In the meta-analysis by Zuccollo and Fletcher-Wood (2020, p. 8), they found that quality PD has a greater effect on pupil attainment than other interventions schools may consider, such as implementing performance-related pay for teachers or lengthening the school day. In the systematic review by Sims et al. (2021, p. 41) three forms of PD - lesson study, instructional coaching, and teacher learning communities were associated with the greatest impact.

The Developing great teaching review (Cordingley et al., 2015, p. 4) indicated that in terms of impact on student outcomes, subject-specific PD is more effective than generic pedagogic PD, and that "Prolonged or extended interventions were found, more or less universally, to be more effective than shorter ones. Most reported programmes lasted at least 2 terms, more commonly a year.". The Rapid Evidence Review by the Wellcome Trust (2018, p. 6) noted "there is a need for an increase in effective PD in the UK, and for building awareness of effective practices.".

Background to the study

The Advanced Mathematics Support Programme (AMSP) is a government-funded initiative, which came into existence in 2018. It is led and delivered by education charity Mathematics in Education and Industry (MEI). The primary aims of the AMSP are to increase participation in Core Maths, AS/A level Mathematics and Further Mathematics, and support improvement in the teaching of these Level 3 mathematics qualifications. To achieve its aims the AMSP provides a wide range of PD programmes to teachers in state schools in England; over 50,000 hours of PD was provided in 2022-23.

The purpose of this study was to gain additional insights and evidence to that collected during/immediately after teachers had undertaken the course, by considering impact of specific AMSP PD 12-18 months after course completion.

The study

Design and implementation

A suitable methodology was determined to be an in-depth online survey. This would be efficient, balancing the need to get useful outputs against the time and resource available. The online survey could be completed anonymously, enabling teachers to submit their true reflections without any concern of being identified.

Most of the questions were from previously created surveys, with some additional new specific impact questions. The survey included different types and style of question, from check boxes, to drop-down boxes, to open text boxes, to 5-point Likert scale questions. Created using Survey Monkey software, the survey had 24 questions across four sections:

- **Background** (gender, ethnicity, role, school type, years of service)
- **PD attended** (AMSP courses, number of events AMSP/other, effectiveness)
- **Impact of AMSP PD** (on their practice, department/school practice, on students, timing of any impact)
- **Future engagement with PD** (plans, barriers, attend/recommend AMSP PD)

Careful consideration was given to determining the group of teachers to be involved in this study – those on sustained AMSP PD courses undertaken in academic year 2021-22, were selected as the appropriate group. This date range balanced the ideal of allowing some time post-course completion for impact to have been observable, but was sufficiently timed post-pandemic that things may have been more ‘normal’ in schools/colleges than during COVID-19 years of 2019-20 and 2020-21.

Administration and response rate

An email invitation to participate was sent in June 2023, with a closing date of July 2023. The invitation contained an explicit mention of the relevant AMSP PD course(s) the teacher had attended in 2021-22. This was essential because preliminary analysis showed some teachers had attended courses other than those of particular focus for this study.

There were 868 teachers who took part in suitable AMSP PD courses who received the invitation. After the closing date, following one reminder, 190 responses were received, thus an approximate response rate of 22% was achieved. This is in line with the expected response rate for in-depth online surveys. In this instance no specific incentive, such as a voucher, was offered to teachers to complete the survey.

Findings

One of the key sections of the survey, and which is the specific focus of this article, was section three on impact of PD. A set of questions asked teachers to consider different areas of impact and provide comment into open text boxes if they felt there had been any. Comments received were reviewed and categorised into common themes/statements. The different areas of impact noted in the study will be explored in the sub-sections that follow. Quotations from teachers are also included to exemplify.

Impact area - classroom practice

The question inviting open comment on impact on classroom practice received responses from 125 teachers. 98% said there had been a positive impact. Several themes emerged within this area – the most common was an increase in confidence. Example comments made to this effect included:

I have gained a lot of confidence in content delivery. Helped in planning effective lessons with right level of examples and challenge questions.

The course has had a positive impact on my classroom practice, gave me confidence by helping me build my subject knowledge.

Gave me lots of ideas to improve my pedagogy and refreshed my subject knowledge/improved confidence.

Networking with other professionals who were also experiencing the same anxieties I had about teaching A level really helped boost my confidence. I realised that I knew more than I thought but was able to fill in gaps via the course.

From the small number of exemplified comments above, it's clear that the increase in confidence was in various areas – in delivery, in content and in appreciating their own experience and knowledge for example. An additional observation, even in this first theme, is in most instances it wasn't just one aspect that was reported, but multiple aspects that interacted with one another to provide broader evidence of impact. One such example being:

I have been more efficient with lesson planning, increased my subject knowledge and generally felt more confident with delivering content in lessons.

Another theme observed within the responses to the question on classroom practice, were comments on enhancement within and across key stages – of the 190 teachers who responded to the survey, 149 worked in institutions with students aged 11-18. Comments made in this area, included:

The course helped change my teaching pedagogy - building in new ways of teaching certain topics, as well as helping make connections between different parts of the A-Level content.

The course helped to improve my content and pedagogical knowledge particularly relating to the A level content. However, aspects of the course have also helped to improve my pedagogy at KS4 level.

There has been a big impact on my classroom. Not just with KS5 but also across KS3 and 4 with regards to how I teach and how I want to develop my lessons to engage students.

Impact area - students

It follows that if, as cited above, impact on classroom practice was successful, then impact on students could be a related outcome. The survey question that focussed on this aspect had responses from 117 teachers, with over 70% indicating there had been a positive impact (the other 30% indicated that they couldn't yet tell if there had been any impact). Themes in the comments received in this area included increased student confidence, increased student engagement and improved results, for example:

Students have been more confident and had a much better understanding behind the concepts so they can adapt to more complex problems.

Students' confidence has been heightened with greater number willing to ask questions and engage in lessons.

I have seen an impact on the understanding of a topic from pupils, as the course went in to necessary detail to help my subject development.

It really made a lot of impact on the students. The strategies of the content delivery from the course, together with the most misconceptions enabled me to tune my lesson planning and content delivery which improved their confidence and engagement, as well as their results.

Whilst there were many positive and supportive comments, it should be noted that these were generally self-reported and observational by teachers, and so caution should be made as to reading too much into the impact on students.

Impact area – sharing ideas/knowledge across a department/school

In addition to teachers considering impact on their own classroom practice and on their students, the third area was departmental or school-wide outcomes. There were responses from 117 teachers to this question, with almost three quarters indicating some sharing of ideas/knowledge. Themes included departmental sharing and schemes of work, for example:

Shared practice with other colleagues - particularly 6th form teachers. Some changes - types of questions that we ask students, how much direct instruction we want to give them.

I have shared some of the ideas and resources with the department, which has resulted in changes. The scheme of work being changed.

I have shared resources and practices with my department, in particular how to better use graphing software throughout the course.

By sharing the ideas and resources from the course with my department there has also been a positive impact on the efficiency and content of lesson planning for other members of the department.

It is clear from the volume of rich comments received in this area that the impact of the PD was very often being felt much wider than just the individual who had attended.

Broader perspective

In the previous section, consideration was given to the several hundred comments received from teachers to the open text survey questions on impact. Also included within the survey was a 5-point Likert scale question-set that was aligned with that in the Ofsted survey (2023, figure 11). This considered how effective the PD had been in developing a range of education traits.

Reflecting on your experience of participating in an AMSP PD course in 2021-22, to what extent, if at all, do you think it has been effective in the following?	Very effective or somewhat effective (AMSP survey of 173 responses)	Very effective or somewhat effective (Ofsted survey of 1953 responses)
Developing new practices	95%	57%
Developing new pedagogical knowledge and understanding	95%	56%
Developing my professional habits and behaviours	86%	56%
Building professional confidence	94%	52%
Developing new subject-specific knowledge and understanding	94%	51%

Table 1 - Percentage of teachers from AMSP survey and Ofsted survey who thought the PD was very effective, or somewhat effective in several different areas.

Responses to the AMSP survey showed high percentages in all five areas for the PD being very effective or somewhat effective. Four of the five scored 94-95%, with the highest two areas being developing new practices and developing new pedagogical knowledge and understanding. For the Ofsted survey, the responses that said the PD was very effective or somewhat effective ranged from 51-57%, with the top values seen for the same areas as in the AMSP survey.

Responses to the Ofsted survey were from teachers who had undertaken a wide range of PD, in content, style and delivery. Whilst it may therefore not be possible to make direct comparison between the same question sets in the AMSP and Ofsted surveys, the distinction to note is that the AMSP survey was focussed on subject-specific sustained mathematics PD. The high values seen within the AMSP survey can be acknowledged within that context.

Most impactful PD

Aside from questions within the survey that asked about impact in specific areas, a more general question was also posed – ‘In terms of the professional development you've undertaken during your teaching career (AMSP or otherwise), what has been the most impactful and why?’.

There were responses from 115 teachers to this question. In many instances specific people/organisations/courses were named, but overall, two areas of PD were roughly equal in being cited most often (each by 40% of teachers) – subject knowledge and pedagogy. Networking and sharing ideas/resources was highlighted by around one in six teachers. Example comments teachers made, include:

Professional development that focused on content and pedagogical knowledge simultaneously have had the greatest impact on my practice. This is so as these two elements are critical in improving one's practice.

Sustained courses with time for study, questions, discussion reflection are most impactful but clearly required most prep and dedication.

Reflecting on Pedagogy and own practice when introducing new topics and concepts.

The most impactful have been maths subject specific courses using strategies, examples and tasks that can be adapted for use in class have been most effective.

The opportunity within the course to be observed teaching and get detailed feedback. Key Stage 5 lessons especially are rarely observed or prioritised so getting feedback on it was really useful.

Sustained courses have easily been the most useful I have done. The length of the courses allowed me to find the time to study when it was convenient. The tutorials helped with teaching ideas and to clarify my thinking on various topics. The final assignment allowed me to do some maths, which is always nice, but also forced me to think about what the students would struggle with. All in all, it works very well.

Concluding remarks

This study enabled teachers to indicate, in their own words, what impact sustained mathematics PD had, 18-months on from participating in such courses. The 190 teachers who responded, from the 868 invited, noted positive impact on their own classroom practice, on their students and across their department/school. Many teachers cited an increase in confidence, and enhancement of skills and knowledge

within and across key stages. In most instances it wasn't just one aspect that was reported, but multiple aspects that interacted with one another to provide broader evidence of impact.

When specifically asked what had been the most impactful in terms of the PD they had undertaken during their teaching career, overall, subject knowledge and pedagogy were the two areas of PD cited most often (each by 40% of the 117 teachers who responded to this question).

Acknowledgements

The work reported in this paper formed part of the AMSP, which is DfE funded.

References

- Cordingley, P., Higgins, S., Greany, T., Buckler, N., Coles-Jordan, D., Crisp, B., Saunders, L. & Coe, R. (2015). Developing great teaching: Lessons from the international reviews into effective professional development. Teacher Development Trust.
- Fletcher-Wood, H and Zuccollo, J (2020), The effects of high-quality professional development on teachers and students – A rapid review and meta analysis. EPI.
- Ofsted (2023) Independent review of teachers' professional development in schools: phase 1 findings May 2023.
- Sims, S., Fletcher-Wood, H., O'Mara-Eves, A., Cottingham, S., Stansfield, C., Van Herwegen, J., Anders, J. (2021). What are the Characteristics of Teacher Professional Development that Increase Pupil Achievement? A systematic review and meta-analysis. London: Education Endowment Foundation.
- Wellcome Trust. (2018). Developing Great Subject Teaching - Rapid Evidence Review of Subject Specific Continuing Professional Development in the UK. Welcome Trust.