Schools guide to the TSSP school case studies

Triple Science Support Programme Evaluation 2011 - 2014

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SQW

Contents

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1. Introduction

What is the purpose of this guide?

The Triple Science Support Programme (TSSP) was delivered in England, through the network of Science Learning Centres, to 755 schools between 2011 and 2014. As part of the wider complementary provision to any secondary school, 30 Networks of Excellence were set up and 21 were still in operation by March 2014. These networks comprised clusters of local schools that worked on joint activities to improve triple science teaching.

This guide highlights some of the main learning points identified during visits to some of these schools and networks. Each of the 20 TSSP schools SQW visited received interventions to introduce or improve triple science delivery under the TSSP. In addition, evidence is drawn from 10 case studies of Networks of Excellence. We draw out exactly how the TSSP contributed to helping each school or network implement effective practice in the teaching, learning and management of triple science.

An overview of the TSSP, which explains the core TSSP and complementary provision, is presented in the box below:

What is the Triple Science Support Programme (TSSP)?

The core TSSP provides support to eligible schools who are either:

- not currently offering triple science, or;
- offering triple science to relatively small numbers of pupils

The aim is to help schools introduce or strengthen triple science delivery.

As a first step, each science department undertakes a needs analysis with a specialist TSSP Advisor, to identify the issues which are hindering triple science delivery.

Next the TSSP Advisor supports the school in developing and working through an action plan to introduce, safeguard and expand triple science. Usually this involves overcoming logistical challenges and developing teachers' pedagogical skills and subject knowledge across the three sciences.

TSSP schools are then provided with tailored support for science department management and training for staff based on the action plan.

Complementary TSSP provision

Beyond the core programme of TSSP support for eligible schools, all schools (irrespective of whether they are eligible for the core programme or not) can access a universal offer of support. This includes:

- **Triple Science Networks of Excellence** are spread across the country and offer a mix of activities, from specialist continuing professional development (CPD) to interventions for target pupils. They are open to all schools as part of the wider TSSP:
  - Networks are funded to build the capacity of all types of schools in delivering triple science, widen access for pupils and help secure the sustainability of triple science.
  - Every network is facilitated by an advisor who supports each cluster of schools to develop an action plan for the network. This includes a set of activities to stimulate interest in Science Technology Engineering Maths

(STEM) careers and increase take-up and attainment in triple science, particularly amongst under-represented pupil groups (including pupils who are girls, pupils eligible for free school meals, pupils who speak English as an Additional Language, and pupils who are lower achievers).

  - These activities might include a mix of: Continuing Professional Development (CPD), accessed through the Science Learning Network, or through bespoke in-school training; resource development; interventions for target pupils; and STEM related career activities.

- **Triple Science Online Community** which is one of the tools for drawing on the expertise of other teachers. There are over 200 free hand-picked online resources, ranging from guidance and advice on whole-school issues in managing and teaching triple science, to suggested teaching approaches around difficult topics for pupils.

Source: Myscience

In the remainder of this section, we **summarise the main benefits of the TSSP,** followed by an overview of the **methodology we used to gather this information**. The next three sections are organised into **learning points for science leadership** (Chapter 2), **teaching-related learning points** (Chapter 3) and **pupil-focused learning points** (Chapter 4).

Summary of TSSP benefits

Through our case-study research with TSSP schools, a number of common benefits arising from participation in the TSSP were identified. The benefits to schools, teachers and pupils are summarised below:

Wider school benefits:

- Helped to introduced triple science or widened access to triple science
- Developed staff capacity to teach triple science effectively
- Provided staff with networking opportunities and peer support
- Expected to boost post-16 science entries

Teacher benefits:

- Improved teaching practice and enhanced pedagogical skills
- Increased teacher subject knowledge and the confidence of those teaching in their non-specialist subject areas
- New and improved practical work and experiments
- Personal and career development benefits

Pupil benefits:

- Increased the proportion of triple science entries
- Widened access to triple science amongst non-traditional pupil groups (girls, pupils eligible for free school meals)
- Developed pupils' core skills (e.g. literacy and maths)
- Helped teachers better prepare pupils for new style science assessments
- Engaged and motivated pupils

Source: TSSP and TSN case studies

Case study methodology

The 20 school case studies were conducted by independent researchers, SQW, between October 2012 and December 2013. Each case study involved a full day visit to the school, interviewing Senior Leaders responsible for triple science, the Heads of Science (and Heads of Biology/ Chemistry/ Physics where appropriate), along with triple science teachers, technicians, and pupils studying triple science. Through these interviews researchers elicited views on the relevance, quality and usefulness of the interventions. They also explored the effectiveness and impacts of the support provided. In addition, 10 case studies of Networks of Excellence were completed between June and December 2013. These involved interviews with the Network Leads, representatives of a total of 19 member schools and a selection of pupils.

The case-study research focused on understanding the challenges that schools faced in introducing, expanding or sustaining the delivery of triple science. It explored the extent to which the TSSP 'menu' of support helped science departments to overcome these challenges and collated evidence and specific examples of the programme's impact on teaching and learning.

2. Learning points for science leadership

Introducing or safeguarding triple science

Almost half of the TSSP case-study schools said they were successfully supported to introduce triple science for the first time. A further quarter said that TSSP had helped to safeguard triple science in their school, and three schools reported that it had helped the science department realise their ambition to expand triple science.

According to TSSP case-study schools, the main benefits of offering triple science are:

- the ability to use triple science as a driver for school improvement
- meeting demands to challenge high achieving pupils and making the school more attractive to prospective pupils and parents
- encouraging more young people to take-up A-level sciences (therefore increasing the viability of courses)
- better preparing young people for further science study and helping to reduce drop-out rates for A-level science courses
- enabling young people to take advantage of future jobs in growing science and technology industries

Source: TSSP case studies

Supporting science managers

The mentoring and critical friend role played by TSSP Advisors was valued by a number of Heads of Science. They said they benefited from the independent, trusted advice of an external 'critical friend' and reported that it had helped them to introduce important changes. The Advisors provided ideas and information about what types of approaches had worked elsewhere, as well as signposting schools to resources and CPD. In the context of ongoing wider change in science education, the Advisors' contribution as a 'sounding board' for decision-making was widely appreciated.

"The TSSP Advisor always gives me the most up to date information and explains the implications of policy"

(Head of Science, TSSP school)

The Heads of Science also said they benefitted from intelligence on science education policy provided by their TSSP Advisors, who also set out the implications for science departments. This helped them keep abreast of important policy developments which are likely to impact on triple science, and provided them with access to the latest information sources and materials.

Recommended case-study reading: Ashton Park, Carr Manor, Castle View, Copley, Kettering, Langley, Magdalen, Market Bosworth, and St Marys.

Overcoming timetabling constraints and curriculum-related issues

Two common issues that schools looking to expand triple science faced were timetabling constraints and challenges around curriculum planning. A number of schools were supported by their Advisor to overcome timetabling constraints. For example, they helped to build a case for additional lessons for triple science teaching in the timetable, or provided CPD which increased efficiencies in triple science course delivery.

Curriculum models have also been developed by TSSP schools in partnership with their Advisors, and a number of schools have been supported in the design of new schemes of work for Key Stages 3 and 4. These incorporated many of the resources and practicals introduced through CPD and support provided under the TSSP.

*Recommended case-study reading for **timetabling constraints**: Langley, Magdalen.*

*Recommended case-study reading for **curriculum remodelling**: Chalfonts, Kettering, Kingswood, Langley, and Magdalen.*

*Recommended case-study reading for **new schemes of work**: Ashton Park, Carr Manor, Copley, Kettering, Kingswood, Langley, and Newton Abbotts.*

3. Teaching-related learning points

Improving teaching practice

Develop teachers' skills and pedagogical approaches in triple science

Aside from one-to-one Advisor support, CPD was the activity most commonly accessed by schools and it had the greatest reported impact on triple science delivery. Feedback on this CPD was universally positive. CPD was frequently delivered to whole-departments, which developed the capacity and skills of all science teachers simultaneously. Schools said that teachers have a wider repertoire of skills as a result, and have been seen employing new pedagogical practices in the classroom.

> **"CPD has been useful, particularly for those looking to build on their existing teaching skills and develop a menu of options for delivering lessons, specifically in non-specialist disciplines"**
>
> (Head of Science, TSSP case-study school**)**

The approach adopted in designing and delivering CPD was valued by schools for two main reasons. First, it offered flexibility through providing options for bespoke and school-based training so that it was both tailored and relevant. Second, the quality was consistently high and so the CPD was well regarded by staff. The Networks of Excellence also offer tailored CPD to clusters of local schools through a peer delivery model. These arrangements provide greater opportunities for teachers to network with each other, whilst still accessing specialist and highly relevant CPD.

Schools accessed a wide variety of resources and materials through the CPD provided by both the TSSP Advisors and Networks of Excellence; which are now routinely used in lessons. This has had an impact on classroom practice; around half of the TSSP case-study schools said that they had made use of new resources, strategies, and activities introduced through the CPD they had received. A number of schools said they had developed or improved new schemes of work for triple science, incorporating these resources and materials.

*Recommended **school** case-study reading: Ashton Park, Castle View, Copley, Gateway, Kettering, Kingswood, Lealands, Magdalen, Manchester, Market Bosworth, Langley, St Marys, Trinity, and Whitefield.*

*Recommended **network** case-study reading: Camden, Reading and Wokingham, and Redcar and Cleveland.*

Supporting non-specialist teachers to deliver triple science effectively

Non-specialist teachers received targeted CPD through the TSSP, to improve their subject knowledge in at least one of the sciences and enhance their teaching. This has

helped to develop triple science teaching capacity in schools where it was previously limited, particularly in the subject area of physics, which was the most commonly under-resourced specialism in schools.

*Recommended **school** case-study reading: Copley, Gateway, Kingswood, Kettering, Manchester, Whitefield, and Trinity.*

*Recommended **network** case-study reading: Redcar and Cleveland.*

Raising teaching standards

The mix of TSSP interventions has noticeably improved teaching standards in at least one quarter of the TSSP case-study, schools according to their Heads of Science. They said that teachers appear to have enhanced their teaching methods and were delivering triple science more effectively and efficiently following engagement with the TSSP.

Recommended school case-study reading: Gateway, Langley, Lealands Magdalen, and Trinity.

Generating wider benefits for teachers

Building teacher confidence in teaching triple science

As a result of CPD received through the TSSP, over half of the TSSP schools suggested that greater numbers of staff felt more confident about teaching triple science. This related to both non-specialist and core-subject teaching as a result of engagement in TSSP activities.

*Recommended **school** case-study reading: Carr Manor, Copley, Gateway, Kettering, Lealands, Manchester, Market Bosworth, Newton Abbots, St Marys, and Whitefield.*

*Recommended **network** case-study reading: Reading and Wokingham, and Redcar and Cleveland.*

Providing opportunities to network and offer peer support

It is widely accepted that a teacher will benefit from conversing and sharing good practice with a teacher from outside their own school. It can encourage individuals to be more reflective on their own practice and introduce new ideas and innovation into the classroom. Through the Networks of Excellence, teachers have been able to realise these benefits, whilst receiving expertise from subject or pedagogical specialists. Teachers have also benefitted from opportunities to network through the peer school programme that was part of the TSSP. There will be further opportunities for teachers to take advantage of networking opportunities as the peer-to-peer delivery model for CPD embeds further from 2014 and Myscience delivers bespoke training to local clusters of schools through the Networks of Excellence.

*Recommended **school** case-study reading: Newton Abbots, and Small Heath.*

*Recommended **network** case study reading: Buckinghamshire, Nottingham, and STEM Sussex / East Sussex.*

Career development opportunities

The TSSP has led to positive impacts on some teachers' careers, for example, through developing core skills (such as coaching skills) and even obtaining promotions. Three case-study schools provided examples of staff having benefitted in this way from the TSSP. In two of the case-study networks, there was evidence of staff promotions as a direct result of personal development opportunities arising from network activities, and one teacher involved in developing resources for a Network of Excellence, said that it had a positive impact on his career as it raised his profile amongst teaching colleagues.

*Recommended **school** case-study reading: Gateway, Manchester, and Newton Abbots.*

*Recommended **network** case-study reading: Camden, and Reading and Wokingham.*

4. Pupil-focused learning points

Widening pupil access

Increasing access to triple science

Many of the schools received support from TSSP Advisors to increase the size of their cohorts in the form of one-to-one advice to address timetabling or curriculum issues, combined with Continuing Professional Development (CPD) activities to develop teaching capacity. Our analysis of the national data on Triple Science GCSE entries revealed that the TSSP helped to widen pupil access to triple science, including amongst under-represented groups, such as pupils eligible for free school meals (FSM).

A number of the case-study examples provided information on how the TSSP helped schools to overcome the barriers which prevented them from offering triple science to more pupils. In addition, two case-study Networks of Excellence developed targeted interventions to tackle under-representation of pupils from deprived backgrounds in triple science cohorts. Comprehensive data exercises were carried out to identify pupils and interventions were designed to help overcome the barriers pupils faced in accessing triple science. Interventions were then put in place to address these including, for example, support for maths and literacy skills or projects to raise pupils' aspirations.

> **"Twelve months ago we always thought there would only be one group [for triple science] so we feel more confident now to spread it to two groups because we have had help in managing the risk"**
>
> (Head of Science, TSSP School)

*Recommended **school** case-study reading: Gateway, Kingswood, Langley, Magdalen, Newton Abbots, and Small Heath.*

*Recommended **network** case-study reading: Camden, and Newham and Waltham Forest.*

Better preparing pupils for triple science examinations

Several schools highlighted the need to ensure pupils were better prepared to study triple science before they entered Year 10. These schools were supported through the TSSP to develop pupils' core skills, mainly in literacy and maths. Many of the Networks of Excellence have also focused efforts on developing pupils' literacy and maths skills. Some schools have taken a longer-term approach and have chosen to modify the Key Stage 3 science curriculum to concentrate on developing key skills for science, to strengthen the pipeline of future triple science candidates.

*Recommended **school** case-study reading: Kettering, Kingswood, Lealands, Magdalen, and Trinity.*

*Recommended **network** case-study reading: Buckinghamshire, Camden, Reading and Wokingham, Redcar and Cleveland, Nottingham, STEM Sussex / East Sussex.*

Selecting pupils to study triple science

Given the demands of science GCSEs, it is important to ensure that no pupils are set up to fail in selecting their science courses.

TSSP Advisors worked with schools to improve pupil selection criteria and processes for entry to triple science, through the provision of:

- one-to-one support to better systematise use of pupil performance data
- bespoke training to improve the identification and selection of pupils for triple science
- free online resources (available through the National Science Learning Centre) to help identify and inspire pupils in triple science[1]

*Recommended **school** case-study reading: Langley, and Market Bosworth.*

Raising pupil attainment

Ensuring pupils have the key skills to succeed in triple science

A number of schools accessed CPD through the TSSP, including training to raise attainment and to develop key skills such as literacy and maths. This training involved, for example, bespoke CPD to develop the teaching of literacy in science, tailored to address the specific areas of concern for each school. In particular, CPD was designed to help schools prepare pupils for the new assessment demands, including controlled assessments and extended writing. This led some schools to focus on developing pupil literacy skills (where these were weak), for example, science teachers received CPD covering strategies for effective writing (such as scaffolding techniques) and TSSP Advisors introduced teachers to resources to develop pupils' scientific writing. These types of CPD activity were also offered to schools through the Networks of Excellence.

Around half of the pupils we spoke to in case-study schools said that they found the maths components of triple science very difficult because they did not have sufficient maths skills in place. Following work with the TSSP, a number of schools employed new strategies and resources to help improve pupils' maths skills. Almost three quarters of TSSP case-study schools reported improvements in pupil literacy as a consequence of the support programme and said that pupils were better prepared for the new assessments as a result, particularly for questions requiring extended

[1] These are available to all schools through the National Stem Centre online: http://www.nationalstemcentre.org.uk/triplescience/groups

written answers. Teachers said they were expecting to see more overt impacts on pupil attainment in due course.

*Recommended **school** case-study reading: Ashton Park, Carr Manor, Chalfonts, Gateway, Kingswood, Kettering, Langley, Lealands, Manchester, Newton Abbotts, Trinity, and Whitefield.*

*Recommended **network** case-study reading: Buckinghamshire, Camden, Reading and Wokingham, Redcar and Cleveland, Nottingham, STEM Sussex / East Sussex.*

Using practicals and resources to improve the pupil learning experience

The lack of high quality practical work was identified as a barrier to effective triple science delivery by a number of TSSP schools. Through the TSSP, schools accessed specialist CPD to improve the skill-sets of both technicians and teachers and to encourage greater and more innovative use of practicals in triple science lessons. Almost half of TSSP case-study schools indicated that new or improved practicals were introduced due to the TSSP, and there was greater innovative practice and interactive learning in triple science as a result. School science technicians have also benefited from specialist training, and in one Network of Excellence, technicians decided to form their own network and now meet regularly to share good practice. Indeed, the majority of pupils told our researchers that the most enjoyable part of studying triple science was undertaking experiments in lessons. Pupils said that the inductive approach of learning through practical work helped crystallise their understanding of complex science topics.

*Recommended **school** case-study reading: Gateway, Kettering, Kingswood, Lealands, Market Bosworth, and Trinity.*

*Recommended **network** case-study reading: Reading and Wokingham.*