IOP Institute of Physics

Future Physics Leaders

Service Solution Proposal

The Institute of Physics (IOP) is seeking to provide a programme of professional development support for physics teachers and emerging leaders in physics education, called the Future Physics Leaders (FPL) programme and consisting of four strands:

1. professional development for specialist physics teachers;
2. a programme of support and train the trainer exercises for specialist physics teachers to develop them as future leaders and coaches;
3. a blend of recruitment activities and mentoring for newly qualified teachers (NQTs); and
4. continuing professional development (CPD) support for non-specialist teachers.

Programme Design

FPL will be designed on a hub model, where groups of schools will be organised geographically into networks, called Hubs, comprising one Lead School and [redacted] Partner Schools.

> Lead Schools will be schools or colleges with a good record of physics teaching and at least one specialist physics teacher. Lead Schools will provide support to Partner Schools and serve as a hub for network events. Within Lead Schools, the most qualified specialist physics teachers will be offered the opportunity to become Lead Teachers and will be given additional responsibilities, outlined below.
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> Partner Schools will be any other area school that either does not currently have a specialist physics teacher, or that is less advanced in their physics offering.

Eight hubs will be established in each of the three regional TLIF Lots, for a total participation of [redacted]; [redacted] Lead Schools and [redacted] Partner Schools. Delivering this programme in target areas is of great importance as schools serving higher deprivation areas have an expertise gap of teachers with a degree in a relevant subject of 22 percentage points for physics, creating a situation where specialist teachers are highly valued and non-specialist teachers will require additional support.[1]

Schools will be connected through a Development Coach who will implement project activities in two Hubs each, with four Development Coaches per Lot. Each Lot will be overseen by a Team Leader to ensure that the programme is uniformly delivered.

Programme Activities

1. Professional Development for Specialist Physics Teachers

Many STEM teachers do not have the professional development opportunities they require for growth, with professional frustrations frequently cited as a cause for leaving teaching.[2] In order to provide teachers with appropriate professional development support, FPL will support specialist physics teachers through workshops that will touch on advanced topics including:

[1] Social inequalities in access to teachers, Allen, Mian and Sims (2015) SMF

[2] President's Council of Advisors on Science and Technology, (2010). Prepare and Inspire: K-12 Education in Science, Technology, Engineering and Math (STEM) for America's Future. Washington, DC, p. 73

- physics pedagogy for high attainment; engaging low SES and
- female pupils in physics; and physics leadership in schools and
- developing a culture of physics.

Specialist teachers will be bought out from their schools for six half-days per year to complete these activities, which will be organised on a regional basis and led by Development Coaches. By buying out teachers' time, the project seeks not to add to teachers' workloads.

Specialist teachers will also receive networking opportunities that will enhance and expand peer-to-peer relationships. These Regional Day Events will bring specialist teachers together for CPD, to learn about opportunities to work towards professional qualifications, including as a Chartered Physicist, and have informal discussions on lessons, classroom issues etc.

This will help to improve the career progression of teachers and leaders by providing encouraging experiences for existing specialist teachers.[3] Stronger relationships with other local specialist teachers will create a culture of physics in target areas that will help to build teachers' support networks and, in turn, decrease their likelihood of leaving the profession or changing schools out of the region.[4]

2. Programme of support and Train the Trainer Exercises for Emerging Leaders

In order to help establish a sustainable market for CPD and leadership development after the completion of FPL, Lead Teachers will be trained by Development Coaches to lead FPL activities as a School-Based Development Coach. This development programme will be for Lead Teachers in each Hub and will include:

- Attendance at two non-specialist CPD sessions to improve skills in supporting other teachers; and
- two sessions of coach training in their first year on topics such as planning and implementing workshops instead of lessons and training adults instead of teaching pupils.

These activities will prepare Lead Teachers to take over the role of Development Coach when the programme concludes, creating a sustainable model for CPD provision.

3. Support and Recruitment for NQTs

The IOP will also work with Hub schools to identify employment opportunities to be filled by physics specialist NQTs. By working to identify appropriate Hub schools, FPL will place NQTs in a school where they have the greatest chance to progress as a leader.

To ensure the best possible experience for NQTs, prior to placing teachers, the Development Coach will work with the school's leadership team to create a work plan that streamlines a teacher's courses to include only physics and reduces the variation of year groups covered. This will help reduce teacher workload by reducing the preparation necessary to plan a range of lessons across a number of subjects; this has been shown to increase retention and teacher quality.[5]

After a teacher has been placed, they will receive mentoring support from their Hub's Development Coach or Lead Teacher. Mentoring support will:

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[3] Scaling CPD through professional learning communities: development of teachers' self-efficacy in relation to collaboration, Weißenrieder et al (2015) Zdm

[4] Engaging Teachers: NFER Analysis of Teacher Retention, Lynch et al, NFER, 2016.

[5] The Price of Misalignment, Donaldson and Johnson (2010) EEPA

- provide personalised support to NQTs to help them
- transition;
- offer guidance on planning lessons and addressing specific content areas; and serve as a sounding board for new ideas, without fear of repercussions.

This will enable NQTs to more easily settle into their new role as well as have a valuable link with the physics community in their area, thereby improving the quality of leaders at all levels and improving retention of high-quality teachers.[6]

4. CPD Support

The most effective mechanism for improving pupil classroom experience is through focused and sustained CPD for teachers.[7] Through FPL, Development Coaches will provide CPD for non-specialist physics teachers throughout a school's entire science department, with evening sessions held twice per term. CPD workshops will:

- Improve subject knowledge and pedagogical
- content knowledge;
- Increase confidence in teaching in an effective and engaging way;

Develop an understanding of how pupils can achieve A-A* grades in A-level physics.

CPD will be based on unique IOP resources and will build on the IOP's experience with implementing large-scale CPD activities. Results from previous IOP CPD work found that 97% of participants reported a likely positive impact on classroom practice, demonstrating that these activities will improve the teaching quality and classroom effectiveness of nonspecialist teachers.[8]

Suitability of the IOP to Deliver

The IOP is a leading UK body for supporting the development of physics teachers, having managed a number of successful CPD projects, including the Stimulating Physics Network which supports more than 400 schools in England, and Capital Physics, a hub model for CPD that has been successfully piloted in London. These projects provide effective models for teacher development, based around a team of 'external coaches' facilitating bespoke CPD and mentoring. The projects also represent effective engagement models, including the successful identification and recruitment of schools.

To supplement this expertise, the IOP also brings a number of unique resources for supporting teachers and coaches, including a number of comprehensive, research-informed resources to support physics teachers – these include 'Supporting Physics Teaching'; 'Teaching Advanced Physics'; 'Practical Physics', a webpage offering a collection of physics activities that could be run in the classroom and 'TalkPhysics', a digital learning and networking forum.

[6] Retired Teachers as Consultants to New Teachers: Inservice Teacher Training Model, Gold (1987) ERIC
[7] Yoon, K. et al. (2007). Reviewing the evidence on how teacher professional development affects student achievement. Washington, DC: US Department of Education, Institute of Education Sciences
[8] Capital Physics programme, 2014-2015 review