

TEACHER INDUSTRIAL PARTNERS' SCHEME
EVALUATION FULL REPORT

PREPARED FOR
NATIONAL SCIENCE LEARNING CENTRE

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CONCLUSIONS, KEY FINDINGS AND RECOMMENDATIONS

Conclusions

Evaluation shows that, as a result of their participation in the Teacher Industry Partners' Scheme (TIPS):

- Teachers feel confident to:
 - use engineering examples across all STEM subjects;
 - talk to students about careers in engineering; and
 - build a relationship with the Industry Partner (IP).
- Teachers' attitudes to engineering have been up-dated
- The extent to which teachers can contribute to industry's understanding of the issues and challenges of teaching science at school level depends on the IP's existing knowledge
- It is too early to judge whether long term partnerships between schools and IPs will develop and whether networks of schools in an area can share employer expertise
- Classroom teachers have limited contact with other secondary schools but may be able to work with feeder primary schools

Key findings

The placement programme

- The length and content of the placement programmes works well
- The follow-up session at the National Science Learning Centre (NSLC) was useful and appropriately timed to support the development of school activities arising from the placement. Teachers also valued the opportunity to meet other teachers involved with the scheme.
- The burden for the IP is in planning the programme, which makes hosting two to four teachers at once attractive
- There was agreement that TIPS should be open to non-STEM teachers to maximize cross-curricular opportunities and ensure that the wider industry and not just specifically engineering careers are highlighted in schools

Teachers

- The experience has enhanced the career opportunities of the teachers, with them being given more responsibility, experience of planning and opportunities to engage with projects that would otherwise not have arisen
- Teachers saw the TIPS experience as enabling them enthuse and engage their students and introduce subjects
- Teachers valued the apprenticeship route into work much more after the placement as they now understood that it can lead to a degree and/or to high level jobs and felt confident to promote apprenticeships to colleagues and parents
- Discussions of careers with students were largely informal
- Teachers were motivated by the experience and all have been given a clear and unique role within the science department and the wider school
- Relatively inexperienced teachers reported becoming more confident with students and with their colleagues

- Teachers developed skills that enable them to identify links across subjects to varying degrees
- Teachers developed managerial and leadership skills through planning and championing a STEM club
- Teachers have a better understanding and appreciation of how links with employers can be built to inspire students and guide career choices
- Teachers became aware of the influence they have on students
- The three teachers who experienced the programme as a group continue to support each other
- Awareness of the world of work has been raised and the teachers have become advocates for work placements more generally

Schools

- The biggest tangible impact has been the development of after school clubs
- The impact on classroom teaching through schemes of work will take longer to work through as these are planned a year in advance but some thought that the experience was more relevant to the D+T than the science curriculum. Others saw that engineering can be used to introduce topics across all subjects
- There has been limited dissemination to other teachers, especially those outside of Science but schools plan to do this as new schemes of work and extra-curricular clubs are developed
- Dissemination outside of Science has raised the profile of the Science department
- There was enthusiasm for cross-curricular working but in large schools with established ways of working this can be difficult to implement
- All the schools said that it was essential to select teachers with the right attitude and personality for the school to gain maximum benefit from TIPS
- TIPS was deliberately used to by schools to enhance the career of the teacher as well as to support the schools in developing their STEM offering
- Visits between IPs and schools are developing and are expected to increase as extra-curricular activities get underway

Industrial Partners

- IPs main reason for involvement was to encourage young people into engineering careers and the wider industry
- There is a danger that IPs see the relationship as one-way (transmitting information about STEM workplaces and careers to schools) and do not take the opportunity to learn more about how schools operate and what they can do to support them

Potential barriers to impact

- Length of the placement may deter some schools and teachers from taking part
- Loss of momentum on returning to school
- Lack of time for the teacher to develop and execute plans
- Lack of funding within the school to support extra-curricular activities
- Limited opportunities to disseminate to colleagues, especially on routes into engineering careers
- Delay in being able to re-draft schemes of work
- Opportunities to discuss careers with students was largely informal
- Placement teachers have limited contact with other schools

- Parental attitudes to apprenticeships

Recommendations

The placement programme

- Teachers should have more specific information about TIPS and its objectives before starting the placement
- Two weeks is the ideal length of time for the placement
- The time in the school year at which the placement occurs needs to be flexible to accommodate different school circumstances
- Given the length of the placement it seems unnecessary to take another half day from the teachers' timetable for induction but IPs should be made aware of the need for an induction session about the IP's business and organisational structure. If the session takes place, thought needs to be given to the content
- Placement teachers should have the opportunity to meet both graduate trainees and apprentices so that they can compare entry routes
- The objectives and audience for the final presentation at the end of the placement needs to be clarified for IPs and teachers
- Teachers should be encouraged to build relationships with individual staff (where the IP is amenable) to facilitate an on-going relationship
- More support is needed for some teachers to see links into all STEM subjects

Schools

- Some thought should be given to engaging non-STEM teachers. This would help other subjects to use engineering examples to introduce topics and encourage students to consider working in the sector in non-engineering occupations
- Schools should consider in advance how they will take the placement experience forward, in particular there should be a follow-up meeting in the school as soon as possible after the placement to maintain momentum
- Schools need to be proactive in building relationships with the IP post placement as they are better placed to identify how and when the IP can best support them
- There needs to be a balance between the need for a direct educational rationale and the desire to extend teachers' skills set beyond 'better delivery of lessons'.

IPs

- Future IPs should be provided with an outline programme and TIPS' objectives
- IPs might be encouraged to think about how they will work with the placement schools longer term as part of developing their initial placement programme. They should consider what resources they can regularly commit prior to the placement and during the placement work with the teachers on activities
- IPs might be encouraged to consider taking more than one teacher at a time, from different schools. This is time efficient for the IP and provides a richer environment for the teachers and may begin to build links across schools relatively close to the IP

NSLC

- Classroom resources should be provided by the NSLC to support teachers in the classroom and facilitate translation of their placement experience
- Additional channels of marketing, such as other organisations' newsletters should be explored

APPENDIX 1: EVALUATION FRAMEWORK

The table below presents the revised TIPS objectives following the pilot evaluation.

Aim	Objectives	Indicators	Measures	Data Sources
To increase awareness of the nature of modern engineering and career opportunities in the engineering and manufacturing sectors, among teachers of STEM subjects	1. Up-date teachers' attitudes towards careers in the engineering sector by engaging teachers in the world of work	Teachers have a better understanding of engineering sector careers and entry pathways following their placement	Extent to which teachers' understanding is more accurate	Questioning/Survey of teachers before and after placement
		Teachers' attitudes to engineering sector careers have changed following the placement	Extent to which teachers' attitudes have changed	Questioning/Survey of teachers before and after placement
		Teachers' attitudes to engineering sector careers remain changed a year after the placement	Extent to which teachers' attitudes remain changed	Questioning/Survey of teachers a year after placement
	2. Enable discussion of engineering industry contexts in lessons to provide education about career opportunities in the sector to young people	Discussion takes place during lessons on careers in the engineering sector	Extent to which careers discussions take place in lessons	Questioning/Survey of teachers after placement
			Age groups with which discussions take place	Questioning/Survey of teachers after placement
	3. Enable the use of engineering examples in schemes of work at all levels	Schemes of work across the curriculum have embedded engineering examples as a result of the placement experience for all age groups	Extent to which schemes of work have embedded engineering examples related to the placement across the curriculum	Questioning/Survey of teachers after placement

Aim	Objectives	Indicators	Measures	Data Sources
			Extent to which schemes of work have embedded engineering examples related to the placement across all age groups	Questioning/Survey of teachers after placement
	4. Stimulate the development of extra-curriculum engineering clubs to increase the number and range of young people engaged in engineering	New engineering clubs have been started by the TIPS teacher or with their input	Nature and number of new clubs	Questioning/Survey of teachers after placement
		More students are engaged in engineering clubs post placement than before	Percentage increase in students involved in extra-curricular engineering clubs post placement	Questioning/Survey of teachers after placement
			Percentage increase in girls and BME students involved in extra-curricular engineering clubs post placement	Questioning/Survey of teachers after placement
	5. Promote long-term relationships between teachers and employers	Long-term relationships between the TIPS placement employer and the teacher has developed	Nature and frequency of meetings/interactions	Questioning/Survey of teachers one year after placement
				Questioning/Survey of IPs one year after placement
	6. Contribute to industry's understanding of the issues and challenges of	The IP is more effectively involved with local schools	Number of school interactions IPs have with schools	Questioning/Survey of IPs one year after placement

Aim	Objectives	Indicators	Measures	Data Sources
	teaching science at school level		Nature/depth of the interactions IPs have with schools	Questioning/Survey of IPs one year after placement
			Effectiveness of relationship with schools	Questioning/Survey of teachers one year after placement
	7. Create a network of schools in an area that can share industrial expertise, raise the industrial presence in their local community and share educational outputs from placement teachers with support from the NSLC and the IP ¹ .	IPs and/or TIPS teachers' schools are working with other schools locally to share experiences	Scale of inter-school working	Questioning/Survey of IPs one year after placement
			Number of schools each IP is working with	Questioning/Survey of teachers one year after placement
				Questioning/Survey of IPs one year after placement

¹ From this research it seems that collaboration and sharing between secondary schools is decreasing as they compete for students.

APPENDIX 2: DETAILED FINDINGS

A2.1 Background and Introduction

The Teacher Industrial Partners' Scheme (TIPS) aims to increase awareness of the nature of modern engineering and career opportunities in the engineering and manufacturing sectors, among teachers of STEM subjects.

The scheme places Science, Design and Technology (D+T), Engineering, Computing or Mathematics subject teachers with an engineering Industry Partner (IP) for a two week placement, which is supported through professional development sessions run by the National Science Learning Centre. Each IP nominates an Industrial Mentor to liaise and support the teacher. Some IPs will have a separate coordinator to organise the placement and deal with any administration.

TIPS is a joint initiative within Project Enthuse, conceived and sponsored by the Institution of Mechanical Engineers (IMechE) with further support from the Institution of Engineering and Technology (IET) delivered in partnership with the National Science Learning Centre (NSLC).

TIPS is currently in its pilot phase which commenced in July 2014 and will be completed by December 2015, by which time 32 placements will have been completed.

The initial placements involved three teachers who were placed at the same IP during July 2014 and went through the same programme together. One further teacher was placed with an IP during the autumn 2014 term. The programmes were similar in content and structure. One of the teachers works at a university technical college (UTC), which has implications for the way in which they have used the teacher's TIPS experience.

This evaluation report covers the pilot period up to the end of the first four placements, including school visits to the four teachers. For the most part this report is an up-date of the interim report provided in January 2015 including additional information gleaned from the fourth placement. Where there have been developments, particularly in marketing and administration, that do not affect these four placements, information about the current situation has been provided in 'up-date boxes'. Some other changes have been made to make the report relevant to both placements and all four teachers.

Project objectives

The development of the evaluation framework in Appendix 1, based on this pilot evaluation, has led to the objectives being refined; however, originally TIPS aimed to:

- up-date teachers' attitudes towards careers in the engineering sector by engaging teachers in the world of work;
- enable discussion of engineering industry contexts in lessons to provide education about career opportunities in the sector to young people;
- promote long-term relationships between teachers and employers;

- contribute to industry's understanding of the issues and challenges of teaching science at school level; and, longer term to
- create a network of schools in an area that can share industrial expertise, raise the industrial presence in their local community and share educational outputs from placement teachers with support from the NSLC and the IP.

Importantly, the impact of TIPS is expected to be on the teachers involved and other teachers, not *directly* on students, and this remains unchanged.

Draft up-dated objectives can be found in the evaluation framework in Appendix 1.

Evaluation objectives

The objectives of the evaluation are to:

- explore the impact of TIPS on the teachers with respect to their attitude to engineering;
- explore any wider impact of TIPS on the teachers' schools and colleagues;
- identify strengths and any difficulties in the different circumstances for delivery and administration of TIPS from the perspectives of the teachers and the IPs, the NSLC, the IMechE and the IET;
- make recommendations to address any difficulties identified;
- propose/clarify objectives for the main stage of the project; and
- propose an outline evaluation framework for the next phase of TIPS.

Pilot evaluation methodology

The pilot evaluation involves:

- attendance at the placement final day presentations;
- in-depth qualitative telephone interviews with teachers, industry mentors and co-ordinators as soon after the placement as possible;
- an in-depth qualitative telephone interview with the lead at the NSLC at the start and end of the evaluation;
- in-depth qualitative face-to-face interviews with IMechE and IET project leads at the start of the evaluation; and
- school visits in the second half of the term following the placement, including interviews with the teachers and members of the senior leadership team.

A2.2 Findings

The sponsors' objectives

The objectives presented in the previous section represent the agreed objectives for the two sponsoring organisations and the NSLC. While the emphasis is slightly different for each organisation, they are agreed that influencing teachers is a way of embedding culture change more sustainably than focusing on events for students. They all hope that reaching teachers who will teach for years will impact on more students with fewer resources than continually running activities for a new wave of students every year. They believe that impacting on teachers and their behaviour in school is key to the success of the scheme.

The teachers' objectives

Very little detail was available to the teachers about the content of the placement, the IP organisation or the detailed objectives of TIPS before starting the placement. This was a minor criticism from some of the teachers.

The main motivation teachers reported for taking part was to enthuse students about STEM in their classroom work, through extra-curricular activities, by making subjects more relevant and by being able to provide information about engineering careers. Some of the teachers were aware that they knew little about engineering and saw this as an opportunity to learn more. There was also some awareness that there is a shortage of engineers in the UK and that this might be one way to address this issue.

The industry partner's objectives

Both IPs became involved in TIPS to better inform young people about careers in engineering with a view to encouraging more to choose an engineering career. For one IP this was driven by the need to engage local communities in a major engineering project, while for the other it stemmed from a personal experience of the need for teachers to have a better understanding about engineering as a career.

It is hoped that the teachers who have been on the placement will:

- have a better understanding of what a job in engineering entails;
- promote engineering careers;
- have a better understanding of the breadth of engineering careers and careers linked to engineering;
- have a better understanding of vocational routes into engineering careers; and
- use engineering as an example in their teaching across the curriculum, not just in STEM subjects.

Working directly with teachers in this way was a new approach for both IPs. One IP had previously focused on activities for young people, although there has been some teacher CPD in partnership with the NSLC and a major London museum. The other IP is a fairly new company that has struggled to recruit quality trainees; that is trainees who it feels are 'work ready'. Some staff at both IPs are STEMNET Science and Engineering Ambassadors or similar, who work with local schools on a regular basis, especially in after-school clubs and mentoring students. One IP has

been involved in the Big Bang. Their involvement in schools was prompted by a perception that university graduates lack practical experience. Moreover, the IP reported that finding young people with academic qualifications was less of a problem than finding those with 'softer skills' who 'look the part', dress appropriately and are able to talk about their aspirations. The IP hopes that as a result of the placement teachers will realise the importance of these 'softer skills'.

One IP also sees taking part in TIPS as supporting stakeholder relations. The team reported that stakeholders, especially those in the political sphere, were very interested in TIPS.

Both IPs have committed to taking further teachers.

The schools' objectives

In all of the schools the initial invitation went to a member of the senior leadership team (SLT) and not to the teacher. The four schools involved selected their nominated teacher with care to ensure maximum benefit for the teacher and for the school. They have therefore been very supportive, not just in allowing the teachers time to go on the placement but also in helping them afterwards to develop from the experience and to plan extra-curricular activities. Moreover, interviewed after the placement, senior leaders said that they would send other teachers on a (different) TIPS placement.

The schools saw the main benefits of TIPS as supporting:

- staff development, especially as a way to build confidence and broaden the role in the school of a teacher with the potential to progress beyond classroom teaching; and
- the development and expansion of extra-curricular activities, particularly after-school STEM clubs.

One of the schools is a University Technology College (UTC)². For the UTC having more teachers with an understanding of engineering and engineering careers is seen as central to the objectives of the institution.

UTCs:

- take students from the age of 14 (at the start of Key Stage 4);
- are significantly smaller than the average state secondary school with around 600 students;
- focus on one or two technical specialisms;
- work with employers and a local university to develop and deliver their curriculum; and
- dedicate significant time to the technical specialism

² See: <http://www.utcolleges.org> for more information on UTCs. The information in the box is taken from this website.

Marketing

One placement came about as a result of a developing relationship between the IP, IMechE, IET, the Royal Academy of Engineering, the Institute of Civil Engineering and the Institute of Physics. The other was the result of personal contact between IMechE and the IP.

These participating schools became aware of TIPS through a fairly intensive programme of contacting individual schools. One senior leader suggested that as well as the NSLC newsletter, TIPS could be marketed to schools via other channels such as the National College for Teaching and Leadership newsletter.

Up-date:

There is now a waiting list of teachers and employers are pro-actively contacting the NSLC to take part. It is expected that by the end of 2015 there will have been between 40 and 50 placements.

Administration

From the perspective of the teachers the administration was straightforward and light touch. The teachers highlighted that this was essential, especially in the summer term when exams and marking take precedence over other activities.

For the IPs the administrative load revolved around developing the programme for the teachers and arranging the meetings with the relevant managers. However, staff tended to understand the need to increase the supply of engineers and were said to be generally supportive in both IPs. One IP felt that the staff's positive attitude towards the placement stemmed from a recruitment strategy that included softer skills in the required skill set.

More information for IPs on the expectations of the scheme would have been appreciated as the IPs reported designing the programme around what they felt teachers would want. Providing information on the experiences of IPs will help future IPs but it was recognised that considering the time the scheme has been operating it was perhaps a little premature for that.

Up-date:

There have been many issues to agree with employers covering, for example, health and safety and expectations and there is now a fairly standard contract. Once an employer has been through the initial set-up procedure this does not need to be repeated for subsequent placements.

The requirements are more prescriptive for employers than for teachers and to ensure the maximum benefit from the placement arrangements, an additional teacher is recruited in the event that one is unable to attend.

NSLC Induction

One placement began with a two hour initial induction course run by the NSLC on the Friday before the two week placement began. This IP runs an induction course for new starters every Monday morning and it was felt that some of the content of the NSLC induction was repeated on the first morning of the placement.

Nevertheless, the teachers said they felt the NSLC induction was about the right length and was essential as the session:

- introduced them to TIPS;
- allowed the paperwork to be completed;
- introduced the placement and why the IP was taking part;
- allowed them to meet the people involved; and
- provided an opportunity to find out more about the NSLC as none had previously taken part in NSLC CPD, although one had used materials from the website.

They found the presentations interesting and all spontaneously mentioned the statistic from the Wellcome Trust Monitor on the percentage of students who ask teachers about careers and the very low percentage who are satisfied with the answers (17%). They acknowledged that teachers are an important source of careers information and that they are not always able to help students.

The other placement did not have this preliminary session. The IP felt that a session before the beginning of the two week placement would have been beneficial. The IP felt that if teachers arrived for the placement better informed it would have enabled quicker understanding of the company, although the teacher felt it did not matter the whole of the first day was spent with the IM getting an understanding of the organisation.

The placement

Teachers' perspectives

All four teachers enjoyed the placements immensely and said it had been highly enjoyable and very successful. The aims of the sponsors and of the IPs were also met in that all four teachers reported that they felt that they better understood modern engineering and the career routes into engineering. One of the teachers stressed that they had thought engineering was a dirty and dying industry but the placement had completely revised her views. Three of the teachers explicitly stated that they now felt confident to act as ambassadors for engineering.

Importantly, the teachers all stressed that following the placement they understood the apprenticeship route into an engineering career and how this route can lead to a rewarding and successful career. They were therefore more confident about promoting apprenticeships and now openly acknowledged that university is not for everyone. They acknowledged that they previously knew little of non-university routes into work but now felt confident to promote them within the school and to parents. In particular, the teachers had not been aware that those following the apprenticeship route could go on to a degree course and/or become very senior in organisations. Apprenticeships had been perceived as suitable for those unable to

follow an academic route leading to intermediate technician jobs. However, all four teachers felt that they would have to address parents' perceptions of apprenticeships as only suitable for low achievers and their preference for their children to follow an academic route post GCSEs. One senior leader believed that the experience had enabled teachers to understand better the post-school options for less academic students.

The three teachers who went through the placement together agreed that this was preferable to going alone. They felt that being part of a small group had enabled them to benefit more from their time on the placement than they might have done alone. There were four reasons for this:

1. when meeting staff they were able to learn from questions asked by each other;
2. they were able to discuss what they were learning and talk about their experiences together, which enabled them to be more reflective than they might otherwise have been;
3. they were able to discuss the tasks set by the company; and
4. there was time between meetings that were filled by discussion that otherwise would have been 'dead' time.

The fourth teacher was on the placement alone. With no other experience she could see no benefits to being part of a group. In particular she did not feel it would be worth sending more than one teacher from her school, although she felt that there are benefits in meeting teachers from other schools. However, she seems to have developed a close relationship with the Mentor, which provided support but this may not always be possible.

One teacher suggested that extending the placement to non-STEM teachers could be beneficial, especially if pairs of STEM and non-STEM teachers from the same school attended together. This sentiment was echoed independently by a senior leader at another school. While economics, business studies, media, D+T and art/art and design were thought to be the subjects where teachers would most benefit from a TIPS placement, because of skills overlaps, other subjects mentioned included history. Moreover, one senior leader felt that two teachers working together would have more of an impact in the school and could work together as a 'knowledge hub' to develop ideas. Indeed, one teacher felt somewhat overwhelmed on returning to school with the responsibility of disseminating the information to staff and students and would have liked the support of other teachers at the same school.

In contrast, another senior leader felt that besides the cost, it would be too difficult to plan for two teachers to be away at the same time unless their timetables were completely independent of each other. Senior leaders thought that the placement was quite long but the potential outcome for the school made the difficulty of cover worthwhile.

All four teachers agreed that two weeks was the optimal length of time for the placement. Any shorter they felt would have been rushed, with less time to reflect and understand the business, which would have meant they benefited less from the

placement. Two weeks was said to be needed to understand these complex businesses and how the sector relates to non-STEM jobs, which is important in promoting engineering and manufacturing more broadly as good sectors in which to work. However, they were not sure what they might have done with any additional time as they felt that they had seen all aspects of the company, although at the time of the school visits one teacher said that, if anything, the placements were too short rather than too long.

The timing also has to be balanced with how long teachers can spend away from school. One teacher felt that she would not have wanted to miss two weeks of school but she had found a locum science teacher who was able to deliver the lesson outcomes and practicals so that the students did not suffer. Without this specialist support she said that she would not have taken-up a placement in term time of longer than one week. Another teacher had been supported by two new Newly Qualified Teachers (NQTs) starting at the school who were used as cover.

The teachers who went on the placement at the end of the summer term said it was the perfect time, once Year 11 students have finished their exams. However, the fourth teacher had not been able to be away from school at this time because of extra-curricular STEM activities.

The highlight of one placement appears to have been the visit to a national museum. This was reportedly because the contact at the museum was an ex-teacher who was able to help the teachers put what their experiences into an educational context. This support seems to have been very important as the lack of an educational focus was seen by teachers as a small weakness in the one of the placement programmes.

Other highlights included meeting engineers and seeing the problems they have to solve. This experience, by allowing teachers to experience engineers' day-to-day life, was said to by some be more insightful than reading about engineering.

The teachers also appreciated the complexity of the IP companies and the need for many more skills than engineering for them to be successful. One was particularly struck by the complexities of procurement. They all reported that they now understand how many different skills work together and the importance of non-engineers and of team work to the success of the overall business.

They all felt that they had got as much out of the placement as possible and that there was nothing else that the IPs could have done for them. One also commented that while the aim was clear, there was a degree of flexibility that meant that the programme was not too prescribed or off-putting.

At one IP it was not possible to include meetings with apprentices, although the IP tried to arrange this. This was the only significant weakness identified by teachers.

At the time of the school visits, about three months after the placement, none of the teachers had changed their perspectives on the success of the programme and saw it as a great opportunity and one that should be available to all teachers.

Industry partner perspectives

The IP representatives all felt that two weeks was the right length of time for teachers to spend with them. Less time, they said, would not allow them to show the teachers the breadth of the company. Longer would have been difficult logistically for one IP, while both said that the teachers could have met with more departments and with some departments for longer, one acknowledged that this had to be balanced with how long a teacher could spend out of school. One IP felt that summer was not the best time because of staff holidays.

The IP where three teachers went through the placement together felt that this worked well for a number of reasons:

- organising the programme took quite a lot of time, planning what to cover and whom to meet and organising the meetings with managers. This would be very labour intensive for just one teacher;
- the staff were thought to find it easier to meet with a small group as this led to the meetings being more conversational, rather than an interview with one teacher asking questions; and
- it enabled the teachers to discuss and reflect on their experiences constructively outside of the meetings with staff.

Three to four teachers was said to be the ideal number, as more than four might be difficult to manage logistically.

Both IPs felt that the teachers maximised the benefits of the placement, although both reported a slow start, possibly because before the placement the teachers did not have much information about the companies or what to expect.

Overall the IPs were pleased with the programme content and structure. Where it was not possible to include discussions with apprentices the IP recognised this as a weakness and would aim to include this in any future placements and indeed, they had tried to involve apprentices.

Final presentation

All four teachers knew that they would have to give a presentation at the end of the placement but the content was left open. While this allowed them to present whatever they wanted, it seems it was something of a worry for the teachers until early in the second week when they decided what they could present. They said that they would have found it helpful to have some guidance on content and purpose.

One IP invited some students from the teacher's school and the Head to visit on the final day of the placement. This group, plus all the staff involved in the placement programme, plus the NSLC co-ordinator were invited to the final presentation to provide an audience and a purpose for the presentation. At the other presentation the co-ordinators and mentors and one of the sponsors provided the audience. The evaluator was present at both presentations.

Follow-up session at the NSLC

About six months after the placement teachers had a one day session at the NSLC.

The teachers thought the trip was useful as it was a chance to catch-up and reflect further on the placement. It was also an opportunity to meet other teachers who had experienced other placements. As the scheme expands there was a feeling that this would become more important.

Ideas on how to take things forward were shared, along with how science teachers might introduce engineering in the classroom. This was said to be very useful as it demonstrated some very simple ways of getting pupils to think about engineering.

The teachers were provided with details of a pool of people prepared to talk in schools, help with lesson planning and an opportunity to use some equipment, all of which was said to be very useful. However, it was suggested that being provided with resources would have been very helpful.

The final session of the day covered how changes within science departments might be made, for example, by starting engineering clubs, changing schemes of work, etc. Possible barriers within the school system to making these changes were discussed. The session on how to set-up clubs and measure student progress was said to be less useful as this is an integral part of working in a school. It was suggested that this session could be improved by providing suggestions or ideas on how to move things forward in school after the placement. For example:

- how to go about starting a STEM club;
- what resources are required?
- what activities could be done in the clubs?
- what STEM competitions are out there for schools to join?

Generally, support from the NSLC was said to be good.

Up-date:

A model for large firms has evolved since these first four placements whereby three or four teachers from different schools are placed together at a company. The group size is determined by the number of people who can be easily transported around the companies' different sites.

During the placement a member of staff from the NSLC visits and potentially inputs to the placement and action planning support is provided. This will be followed by a two-day residential evaluation session at the NSLC a few months after the placement.

Longer-term, it is the intention to build an alumni, with teachers from earlier placements supporting those on later placements both through an online community and by attending later evaluation sessions. The online community will be designed to enable sharing of experiences and ideas, with teachers enrolled in the community before their placement as a way of helping them to maximise the benefits.

The NSLC plans to regularly follow-up teachers.

It is the intention to develop the scheme for small and medium sized companies.

Impact of the placement

Impact on teachers

Short term

The biggest immediate impact on the teachers was the enthusiasm for careers in engineering and related support activities. They admitted knowing little about the sector before the placement but had become aware of the range of jobs covered by the term 'engineer', the many different types of engineers and the importance of team work. One said that they had perceived engineering as a dying sector but now realised that image is out of date.

The teachers reported that students also do not know about engineering because they do not come across it and that many students think that engineers do physical labouring. This was said to especially alienate girls. The teachers now see engineers are problem solvers and to varying degrees have become advocates for engineering.

Those who had not worked outside education reported feeling much more confident answering questions about careers in general and to research other careers for themselves. This was because they felt they had a better understanding of the world of work more generally and that while a core skill (cooking was cited as an example) may interest a student, they now realised that many other skills are required to be successful in a career, such as team work, understanding health and safety, marketing and PR, etc.

In the final day presentations some of the teachers presented plans for rewriting schemes of work to include engineering, citing the examples of forces and circuits that could be related to things they had seen during the placement. It was also suggested that chemistry might include aspects of chemical engineering. Ideas were also put forward as to how non-STEM subjects could use engineering as examples in delivering the curriculum. The session at one IP that involved planning a lesson was said to have been helpful. However, one said that they thought the experience would feed into extra-curricular activities to a greater extent than into classroom work.

The teachers had become advocates for industrial placements for teachers more widely. Only one had worked outside teaching for any significant period and for those who had not, the placement made them realise how narrow is their experience of careers and how important it is for teachers to be able to talk knowledgeably about careers. The teacher who had worked outside teaching valued being able to see a different industry and a modern industrial environment.

Plans to disseminate learning from their experience to other teachers through emails and presentations were to some extent already underway at the time of the interviews in the week following the placement. All four teachers kept a blog during their placement to enable dissemination of their experience.

Regular staff meetings and the development of schemes of work were also said to offer the opportunity to tell other teachers about their experiences and disseminate information along with ideas on how to incorporate engineering in lessons.

The TIPS placement teachers did not have close links with other secondary schools for Years 7-11; indeed, they saw themselves as competitors for students with other secondary schools. However, they saw scope to develop work with feeder schools based on the experiences of the TIPS placement. There were consortia of 6th forms but teachers who did not teach A level were not involved and so were unable to spread their TIPS experience. Wider cross-school interactions seem to take place at a more senior level.

Longer term plans

Immediately after the placements the teachers hoped that their enthusiasm would permeate their departments and generally improve the STEM activities of the school. Plans included:

- working with feeder schools and including engineering in Year 6 lessons;
- using engineering to introduce schemes of work;
- IP talks in the schools;
- development of a STEM challenge;
- teacher visits to the IP;
- school trips to the IP;
- parent visits to the IP;
- student work placements at the IP; and
- potentially recruiting a school governor from the IP.

One teacher felt that a D+T teacher might have got more from the placement, especially in terms of lesson content.

Longer term impact

Three of the four teachers were visited in the second half of the term after their placement to determine whether they had been able to implement any of their plans. The visit to the UTC was delayed until the first week of the subsequent term due to staff changes.

All teachers had benefited personally, three by being given additional responsibility, the fourth (who was more senior) had taken the initiative in asking for a wider role in the school and which the school had agreed.

At the secondary schools two teachers took on responsibilities for developing STEM clubs. The more senior teacher had asked to develop a careers role within the school as a result of the placement experience. Careers advice was perceived to be more important than it had been, as the school is currently expanding from a middle school to an 11-16 school.

At the UTC the teacher had been given a cross-curricular role looking at how all subjects (including non-STEM) could work together to embed engineering across the curriculum and had been able to become involved in some engineering activities from which he would otherwise have been excluded.

Other extra-curricular opportunities also became available to some of the teachers because following the placement they were the obvious choice to support engineering project work in the school. Some of the placement teachers had become the engineering 'expert' in the school, although they knew they were not 'experts'. There was a strong feeling from most of the teachers that the schools had taken full advantage of the TIPS opportunity.

The less experienced teachers felt that the placement experience had given them new opportunities and that the planning and preparation had given them valuable practice in planning and preparing funding cases for activities within their school.

The TIPS placement raised awareness of the world of work outside education, even for those with some experience outside of teaching, and had given the participants opportunities to further their teaching careers. However, it was also seen by some as a potential route out of teaching in the long term.

The TIPS experience made some teachers more aware of the importance of their role in shaping the futures of their students and therefore the importance of being able to talk about careers and non-academic routes into work.

One teacher reported that the placement experience had enabled them to look at topics more holistically and to see connections between subjects. Others struggled more with this and felt that the experience was more valuable for extra-curricular activities where preparation for the workplace could be embedded more effectively than in classroom work. Some teachers said that more direct input to the curriculum would be possible in D+T than in science.

The three teachers who had been on the placement together had maintained contact with each other and were planning to support one another with inter-school visits.

While there was support among the teachers for all teachers to have a similar experience, they acknowledged that while some teachers were keen, others were not very interested. However, they felt that this type of experience would help teachers to understand what students need to be effective in the world of work.

Impact on schools

Senior leaders were unlikely to support teachers in their application to TIPS if they did not see some benefit to the school and students, although they felt this would be difficult to measure. Primarily it was seen as a way of increasing engagement with learning broadly and thereby addressing behaviour and attendance issues, which, longer term, might feed down to better examination results.

There had been considerable activity around planning and writing proposals for STEM clubs/extended activities.

The UTC teacher (who had previously taught in a standard secondary school) felt that it was easier in the UTC to implement his experience from the placement because of:

- the ethos of the UTC and the focus on engineering, which meant that it is easier to get departments to work together on engineering themed projects;
- the presence of an engineering department;

- the cut down curriculum;
- the relatively small size of the school; and
- the UTC was only 18 months old and schemes of work and wider plans are still taking shape. It was therefore felt to be easier to influence how the institution develops.

Additionally, the teacher's cross-curricular role meant that the placement teacher could influence schemes of work and how subjects are introduced across the curriculum so that engineering examples are built-in.

Senior leaders believed that not all teachers would bring the full benefits back to the school and reported selecting the teacher for the placement very carefully. For some schools TIPS was seen as a mechanism through which to develop newer teachers who were energetic, ambitious and by implication, likely to be future leaders; in others, a specific teacher was seen as likely to have an impact on the school because of their personality. In this respect they were seen as role models for other teachers. In all the schools there appears to have been an 'obvious' candidate with little consideration of alternatives.

Developing clubs was seen to give the schools more of a lasting legacy from the TIPS placement than embedding the experience in schemes of work by both teachers and senior leaders. It was also seen as having a more immediate impact as teachers and senior leaders agreed that it would take more time to embed learning from the experience into schemes of work. Moreover, providing this type of enrichment activity was seen to have an impact on the perception of the school locally and to encourage applications.

None of the schools expected that anything from the placement experience could be formally embedded in schemes of work until the 2015/16 academic year, although less formal, introductory elements were being introduced earlier. Where engineering was not taught, it was said to be difficult to fit specific learning from the placement into schemes of work whereas STEM clubs allowed a focus on engineering. Teachers expected out of hours clubs to be running from the start of the following term, although one teacher had been given some slots in an existing programme.

Nevertheless, some revisions to schemes of work were already planned but as yet not implemented as relevant sections of the curriculum had not yet been reached. It was generally agreed that the placement experiences would best inform the chemistry syllabus, with some input to the physics schemes of work but that there was less to take into the teaching of biology, although one teacher saw the use of engineering equipment (such as scanner) in the delivery of healthcare as a way to introduce topics and interest students. As mentioned above, some struggled more to see connections with the science curriculum and felt there would be a more direct effect on D+T lessons.

There is mention above of the impact the ethos of health and safety made on some teachers and one teacher said that this has affected their approach to health and safety at school.

Other teachers beyond those who had experienced the placements had been engaged but the primary impact has been on other science teachers, with dissemination and discussion mainly at departmental level. Again, the UTC has been able to disseminate the experience more widely, for reasons already discussed.

Senior leaders felt that there was more to do on disseminating information among staff but that this would start to happen soon. However, the teachers felt that disseminating careers information to colleagues would be difficult as there are fewer opportunities to discuss careers as a group. Senior leaders felt that dissemination to other staff would enhance the placement teachers' experience and thereby impact on their career development.

Dissemination of careers information to students had so far taken the format of informal discussions. The teachers had been able to give their students insights into the activities with which engineers are involved. They were not only able to demonstrate the breadth of engineering in terms of chemical, civil, structural, electrical, etc. but also were also able to debunk myths about the content of the work, often seen as dirty, manual labour suitable only for lower achievers. Moreover, they felt able to give more informed advice on careers and career paths and believed that this impressed the students who then had more faith in the advice. In one school the placement teacher is planning to take on a wider careers role as a result of her experience.

Engineering was still reported to be of more interest to boys than to girls, with girls reportedly thinking it a boring job for boys³. It was thought that it would be easier to engage girls through activities when they see exactly what is entailed and realise that they are able to complete the tasks. Hence getting the STEM whole school clubs up and running is seen as important. Some boys were said to be excited by the term 'engineering' and had identified engineering as a potential and prestigious career as a result of parental influence but most were said to be unaware of the day-to-day content of a career in engineering. TIPS teachers were able to explain and thereby enthuse this group further.

Non-science and non-engineering aspects of the placement experience and the wider opportunities in the sector had not been always drawn out for students. This was mainly because of the focus on science in the teachers' day-to-day work. However, at the UTC they were aiming to make links across the curriculum, using engineering examples to introduce topics and trying to co-ordinate the order in which topics are taught by subjects so that subjects are reinforcing the same messages at the same time. It was felt this was possible because of the ethos of the school but also because of the small size of the school. There was also the intention to move to 'concept teaching' whereby topics are introduced through scenarios and students build a story, rather than relying on purely teaching content. The placement experience was said to help with both these aims as it had enabled the teacher to see the broader picture and how other subjects are relevant to engineering. This was

³ The UTC is 36% girls at Key Stage 4.

thought to have motivated students who were able to see a purpose in what they were being taught.

In the other schools there was a longer term aspiration to work with other departments, particularly maths and D+T. The aim was to create a cross-curricular experience where the three subjects focused on the same topic, helping students to relate ideas and learning across subjects to specific engineering topics. The practical use of topics is not usually drawn out in lessons and students reportedly find it hard to relate what they have learnt in one subject to another subject.

Other impacts were:

- teachers re-motivated and given a clear and unique role within the science department and the wider school;
- relatively inexperienced teachers became more confident with students and with their colleagues;
- teachers developing skills that enable them to identify links across subjects;
- development of managerial and leadership skills through planning and championing a STEM club;
- engagement in STEMNET as a source of support and ideas;
- raising the profile of the Science department in the school;
- bringing an appreciation of how links with employers can be built to inspire students and guide career choices; and
- raising the profile of the school locally.

While acknowledging a capacity problem, one senior leader said that this type of experience should be available to all teachers as experience of the world of work, while not essential, does help teachers.

A key aim of TIPS is to foster long term relationships between the IP and participating teachers' schools. At the school that was a partner school with the IP, the teacher felt that the relationship built with individual members of staff at the IP was a result of the placement and not of the school being a partner school. Several visits to the IP and to sub-contractors had been arranged by directly contacting staff. However, the senior leader at the school that was a partner of the IP felt that the partnership had been strengthened by the placement.

As yet, no relationships had developed with non-partner schools. It was hoped and expected by some teachers that the IPs would support the STEM clubs being planned at non-partner schools. Senior leaders felt that focussing on a project might be the best way to build the relationship. School leaders also hoped to develop the relationship as a way of identifying speakers and giving credibility to dissemination of the experience. It was also hoped that there would be visits to the IP by other staff and possibly that IP staff would become school governors. One senior leader said that they were amazed how little industry wanted to engage with schools and was not surprised that the relationship had not developed, although there has been a change of personnel at the IP and there is hope that the relationship may yet develop. It was reported that schools want to be able to provide experiences for their

students but this interviewee wondered whether industry believes that schools are looking for financial support and that this perception deters engagement.

Where schools had links with other schools, senior leaders were keen to ensure that the TIPS experience was disseminated. The potential for this level of dissemination was not always known to the placement teacher as only more senior colleagues interact at inter-school level and are aware of various programmes and partnerships that make this possible.

Impact on industry partner

One IP appears to have got more back from the placement than the other but this may be because one was more experienced at working with schools. While at one IP there was feedback on draft STEM engagement materials for schools, at the other a deeper understanding of schools and how they are assessed was achieved. In particular, the IP now understands that schools are assessed on students' academic performance and that this impacts on the 'work readiness' of young people. This IP also realised that the scale of financial support needed by schools for engineering projects is quite small.

One IP has publicised the placements in the in-house newsletter and to stakeholders.

Over a longer period, the impact in terms of building relationships with the participating schools can be tenuous depending on existing relationships. One IP has six partner schools and the support that the IP can offer to non-partner schools longer term is limited by the resources available, although they will seek to provide Ambassadors for school events if asked.

The other IP is keen to develop the relationship further but feels that this may depend on the attitude of the Head and of the IP, which, while positive in this case, may not always be so.

Impact on the mentor

At one IP there was an industrial mentor as well as a co-ordinator who planned and administered the programme. At the other a non-engineering senior manager (board level) acted as mentor and co-ordinator. The mentors found the experience very rewarding, in particular helping to ensure that the teachers benefited as much as possible from the experience and they are keen to maintain contact with the teachers.

Barriers to impact

The main barrier to impact has not materialised but it was acknowledged by teachers and senior leaders that there was a danger that momentum could be lost once the teacher returns to school. It was felt to be important that a meeting between the teacher and the head of science or other school leader should take place as soon as possible on return to school to agree next steps and how best the teacher and the school can benefit from the experience. One school admitted that it had nearly lost this by delaying such a meeting. There is a particular danger when placements are close to the end of term of leaving this meeting until the new term.

Related to this was a time barrier. One senior leader stressed the need to allow the teacher time away from teaching duties to develop teaching content.

It was suggested that future schools and teachers could be better prepared in advance to implement extra-curricular activities much more quickly on return to their school.

The other barrier identified was financial in that there may not be a budget for the necessary kits to sustain STEM club activities.

The length of the placement could be a barrier to taking part for some teachers and longer than two weeks might be a barrier for almost all teachers.

A2.3 Conclusions

Outcomes

Overall the placements were acknowledged to have been very successful by the teachers, their schools and the IPs.

Objectives

There was little information about the scheme available to teachers in advance of the placement, primarily because this was an early pilot. Nevertheless, all the teachers have taken away from the placement the key messages the sponsors and their partner, the NSLC and the IPs intended, namely, that they feel confident to:

- discuss engineering industry contexts in lessons to provide education about career opportunities in the sector to young people;
- use engineering examples to illustrate the curriculum across all STEM subjects;
- talk to students more generally about careers in engineering and in other careers required to support engineering companies/operations; and
- build a relationship with the IP.

Additionally, teachers' attitudes to engineering have been up-dated.

However, the extent to which the placement teachers can contribute to industry's understanding of the issues and challenges of teaching science at school level depends on the extent of the IP's perceived existing knowledge of, and relationships with, schools.

It is too early to judge whether long term partnerships between schools and IPs will develop and whether networks of schools in an area can share industrial expertise, raise the industrial presence in their local community and share educational outputs from placement teachers with support from the NSLC and the IP. However, these findings suggest that classroom teachers have limited opportunities to spread their experiences to other secondary schools but may be able to work with feeder primary schools.

Structure of placement

The teachers and the IPs agreed that two weeks is the right length of time for the placement. There may be benefits to a small group of teachers attending a placement together for both the IP and the teachers but going alone is still a positive experience and may allow a deeper relationship between the teacher and the IP mentor to develop.

The need for the NSLC induction session should be carefully considered to prevent repetition of content while providing teachers with enough background on TIPS and the IP to maximise the benefit of the scheme.

IPs and the teachers agreed that a few tweaks in the programme are all that is needed. Both groups saw that it is important for teachers to meet graduate trainees and apprentices so that they can compare not only outcomes by meeting more experienced staff but also the nature of a modern apprenticeship.

Not all teachers can see how to use their experience within schemes of work.

The sponsors and the IPs feel that there is now a template on which future IPs can build which will be useful in promoting the scheme. This provides an outline programme that will help other IPs design their programmes.

Impact

Teachers

- The experience has enhanced the career opportunities of the teachers, with them being given more responsibility, experience of planning and opportunities to engage with projects that would otherwise not have arisen
- Teachers saw the TIPS experience as enabling them enthuse and engage their students thereby addressing attendance and behaviour issues
- The experience provided a new way to introduce curriculum subjects
- Teachers valued the apprenticeship route into work much more after the placement as they now understood that it can lead to a degree and/or to high level jobs and felt confident to promote apprenticeships to colleagues and parents
- Teachers were motivated by the experience and all have been given a clear and unique role within the science department and the wider school
- Relatively inexperienced teachers reported becoming more confident with students and with their colleagues
- Teachers able to identify links across subjects to varying degrees
- Teachers developed managerial and leadership skills through planning and championing a STEM club
- Teachers have a better understanding and appreciation of how links with employers can be built to inspire students and guide career choices
- Teachers became aware of the influence they have on students
- The three teachers who experienced the programme as a group continue to support each other
- Awareness of the world of work has been raised and the teachers have become advocates for work placements more generally; one plans to take on a school-wide careers advice role

Schools

- The biggest impact has been the development of extra-curriculum activities
- The impact on classroom teaching through schemes of work will take longer to work through as these are planned a year in advance but some thought that the experience was more relevant to the D+T than the science curriculum. Others saw that engineering can be used to introduce topics across all subjects
- There has been limited dissemination outside of Science but schools plan to do this as new schemes of work and extra-curricular clubs are developed
- Dissemination outside of science has raised the profile of the science department
- There was enthusiasm for cross-curricular working but in large schools with established ways of working this can be difficult to implement
- Visits between IPs and schools are developing and are expected to increase as extra-curricular activities get underway

IPs

- One IP has learnt about how schools operate and what support they might offer

A2.4 Recommendations

The placement programme

- Teachers should have more specific information about TIPS and its objectives before starting the placement
- Two weeks is the ideal length of time for the placement.
- The time in the school year at which the placement occurs needs to be flexible to accommodate different school circumstances
- Given the length of the placement it seems unnecessary to take another half day from the teachers' timetable but IPs should be made aware of the need for an induction session about the IP's business and organisational structure. If the session does take place there is a need to think carefully about the content
- Placement teachers should have the opportunity to meet both graduate trainees and apprentices so that they can compare entry routes
- The objectives and audience for the final presentation at the end of the placement needs to be clarified for IPs and teachers

Schools

- Some thought should be given to engaging non-STEM teachers. This would help other subjects to use engineering examples to introduce topics or as a framework for topics. It would also support the objective of encouraging students to consider working in the sector in non-engineering occupations
- Schools should consider in advance how they will take the placement experience forward, in particular there should be a follow-up meeting in the school as soon as possible after the placement to maintain momentum
- Schools need to be proactive in building relationships with the IP post placement as they are better placed to identify how and when the IP can best support them
- There needs to be a balance between the need for a direct educational rationale and the desire to extend teachers' skills set beyond 'better delivery of lessons'.

IPs

- Future IPs should be provided with an outline programme and the TIPS objectives
- IPs might be encouraged to think about how they will work with the placement schools longer term as part of developing their placement programme. They should consider the resources they can commit and during the placement work with teachers to determine programmes of activity to sustain the relationship
- It should be made clear to IPs that on-going financing of schools is not required
- IPs might be encouraged to consider taking more than one teacher at a time, from different schools. This is time efficient for the IP and provides a richer environment for the teachers and may begin to build links across schools relatively close to the IP

NSLC

- Classroom resources should be provided by the NSLC to support teachers in the classroom and facilitate translation of their placement experience

APPENDIX 3: TOPIC GUIDES

Technology CPD Lead, Myscience.co Ltd.

This will be a telephone interview lasting about 45 minutes with the NSLC project manager after the end of the placement.

Introduction

The interviewer and the respondent have already met but to confirm:

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS. The aim is to look at the delivery and organisation process as well as at the impact of taking part on teachers and industrial partners.

Everything that you say will be treated confidence but because of your role in TIPS it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about the identification of teachers and industrial partners and the matching process.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 45 minutes to an hour.

About the respondent

To contextualise your answers during the rest of the interview I'd like to start by finding out more about you and your role.

What is your role at the NSLC?

What is your role in TIPS?

Reasons for involvement in TIPS and desired outcomes for NSLC

Why did the NSLC decide to get involved with TIPS?

What does the organisation hope to gain from involvement?

General administration

Please talk me through how you recruit teachers and industrial partners and the matching process.

What problems or other issues, if any, have there been in identifying and recruiting teachers?

Why do you think that is?

How have you overcome these?

Do you think more can be done to address these issues? Who by?

What problems or other issues, if any, have you had identifying and recruiting industrial partners?

Why do you think that is?

How have you overcome these?

Do you think more can be done to address these issues? Who by?

The placement

Do you have any thoughts on the induction day, now that you have run it once?

Does it cover everything it needs to?

Was there anything that you now think does not need to be included?

The placements have not yet finished but if you have had any feedback from the teachers or the company, what has it been?

Intended impact of the placement on the IE and the IP

What impact do you expect TIPS to have on:

- the teacher?
- the industrial mentor?
- the industrial partner?

FOR EACH ASK:

Why do you say that?

What do you think the barriers are in this being realised?

Intended impact on the school

What impact do you expect TIPS to have on the schools the teachers come from?

Why do you say that?

What do you think the barriers are in this being realised?

Thank and close

Is there anything else that you would like to say?

Is it OK to come back to you if I have any more questions?

I would also like to interview you again later in the pilot phase.

TIPS project managers at IMechE and IET

These will be separately conducted face-to-face interviews after the end of the placement lasting about 45 minutes with the project managers at the two institutions.

Introduction

The interviewer and the respondents have already met but to confirm:

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS. The aim is to look at the delivery and organisation process as well as at the impact of taking part on teachers and industrial partners.

Everything that you say will be treated confidence but because of your role in TIPS it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about the objectives and desired outcomes and impacts.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 45 minutes to an hour.

About the respondent

To contextualise your answers during the rest of the interview I'd like to start by finding out more about you and your role.

What is your role at the IMechE/IET?

What is your role in TIPS?

Reasons for involvement in TIPS and desired outcomes for IMechE/IET

Why did the IMechE/IET decide to get involved with TIPS?

What does the organisation hope to gain from involvement?

General administration

What problems or other issues, if any, have there been in identifying and recruiting teachers?

Why do you think that is?

How have these been overcome?

Do you think more can be done to address these issues? Who by?

What problems or other issues, if any, have there been in identifying and recruiting industrial partners?

Why do you think that is?

How have you overcome these?

Do you think more can be done to address these issues? Who by?

Intended impact of the placement on the IE and the IP

What impact do you expect TIPS to have on:

- the teacher?
- the industrial mentor?
- the industrial partner?

FOR EACH ASK:

Why do you say that?

What do you think the barriers are in this being realised?

Intended impact on the school

What impact do you expect TIPS to have on the schools the teachers come from?

Why do you say that?

What do you think the barriers are in this being realised?

Thank and close

Is there anything else you would like to say?

Is it OK to come back to you if I have any more questions?

I would also like to interview you again later in the pilot phase.

Industrial Mentor

This will be conducted by telephone after the end of the placement and last about 45 minutes. The interviewer has the placement schedule.

Introduction

The interviewer and the respondent will have already met at the end of placement presentation but to confirm:

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS. The aim is to look at the delivery and organisation process as well as at the impact of taking part on teachers and the industrial partners.

Everything that you say will be treated confidence but because of your role in the TIPS pilot it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about TIPS from your point of view.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 45 minutes to an hour.

About the respondent

To contextualise your answers during the rest of the interview I'd like to start by finding out more about your company and your role. Please tell me a little about the company and your role.

What is your role in TIPS? Were you the co-ordinator as well as the mentor? Do you feel that this arrangement worked well?

As part of your role do you usually interact with schools and/or teachers? IF YES: Please explain why/how.

Are you a Science and Engineering Ambassador?

As part of your role do you usually interact with the general public/media? IF YES: Please explain why/how.

Reasons for involvement in TIPS

Why did the company decide to get involved with TIPS?

What other activity does your company do to promote greater interest in STEM?

What does the company hope to gain from involvement, if anything?

What do you personally hope to gain, if anything?

General administration of TIPS

What problems or other issues, if any, have there been in getting involved and organising the placement?

Why do you think that is?

How have these been overcome?

Do you think more can be done to address these issues? Who by?

Were the schools assigned to you or chosen by you? Did you particularly want to get involved with these schools?

Why did you take three teachers at once? Did this present any particular problems?

Experience of the placement

How did the placement fortnight go?

Overall, how successful do you feel the placements were?

What do you think that the teachers took away from the experience?

Do you feel that the teachers got the most from their time with you?

Why do you say that?

What more could they have done?

What more could you personally/the company have done?

Do you think it would have been more effective if the teachers had not always been together? Why do you say that?

What did you think of the celebration presentations?

Do you have any comments on the induction half day? Was it useful? Did it cover everything you needed to know? What was missing? What was not needed?

Expected relationship with teachers and schools

Do you think you will build a long term relationship with the teachers and/or schools that have been placed here? Why do you say that? How do you think this will work? What sorts of activities do you think could take place?

How, if at all, has the placement experience helped you and/or the company more widely to understand more about schools, how they are run and the limitations they work under?

What impact do you expect TIPS to have on the teacher(s) who have placements here?

Why do you say that?

What do you think the barriers are to this being realised?

And how do you expect TIPS to impact on schools more widely?

Why do you say that?

What do you think the barriers are to this being realised?

Wider impact

Are there any wider benefits to the company of taking part in TIPS?

PROBE AS NECESSARY:

- Do you think it will help to raise the profile of the company in the local area?
(NOT FOR CROSSRAIL)
- Do you think it has enhanced the image of the company?
- Do you think it will enhance CSR?
- Do you think it will enhance your tenders?
- Will it help you personally or any of the other staff that have taken part in obtaining professional qualifications?

Do you think that being involved with TIPS will help you to reach other schools/develop relationships with other schools in the area of the schools who had placements here? IF YES: How do you see this developing? PROBE FULLY

The future

Do you think that your company would take part in TIPS again? Why is that?

Would you personally want to be involved again? Why is that?

Thank and close

Is there anything else you would like to say?

Is it OK to come back to you if I have any further questions?

Teachers – Immediately post placement

This will be conducted by telephone after the end of the placement and last about 45 minutes. The interviewer has the placement schedule.

Introduction

The interviewer and the respondent will have already met at the end of placement presentation but to confirm:

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS. The aim is to look at the delivery and organisation process as well as at the impact of taking part on you.

Everything that you say will be treated confidence but because this is the pilot and only a few teachers have been involved it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about TIPS from your point of view.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 45 minutes to an hour.

About the respondent

To contextualise your answers during the rest of the interview I'd like to start by finding out more about your role in the school. What is your position in the school? Type of school?

Do you have any extra-curricular responsibilities?

What subject is your degree in?

Have you been on any CPD courses at the National Science Learning Centre in the past?

Did you have another job before you became a teacher? IF YES: Please tell me about that job and the company you worked for.

Do you use Science and Engineering Ambassadors at your school? Do you have personal experience of them?

To what extent do you agree with the following statements:

RECORD ON SCALE OF 1 TO 5 FROM DISAGREE STRONGLY TO AGREE STRONGLY

- My role is to help young people to understand my subject
- My role is to help young people to pass exams

- My role is to guide young people to a path that could lead to a fulfilling career
- My role is to help young people to have a fulfilling life

Reasons for involvement in TIPS

Why did you decide to get involved with TIPS?

What do you personally hope to gain, if anything?

Why did your school get involved in TIPS?

What does the school hope to gain from involvement, if anything?

General administration of TIPS

What problems or other issues, if any, have there been in getting involved and organising the placement?

Why do you think that is?

How have these been overcome?

Do you think more can be done to address these issues? Who by?

Did you specifically choose to spend time with XXX company or was that all that was offered?

Experience of the placement

How did the placement fortnight go?

Overall, how successful do you feel that the placement was?

Do you feel that you got the most from your time at the company? Why do you say that?

Do you feel that the time was too short/long? Why do you say that?

What more could they have done to help you get more out of it?

What more could you personally/your school have done?

Do you think it would have been more effective if you had had time without the other teachers present or was it better being in a group? Why do you say that?

Would you have benefited from more or less time in some areas of the company? Why do you say this?

Do you have any comments on the induction half day? Was it useful? Did it cover everything you needed to know? What was missing? What was not needed?

To what extent do you agree with the following statements:

RECORD ON SCALE OF 1 TO 5 FROM DISAGREE STRONGLY TO AGREE STRONGLY

- I enjoyed the placement
- I learnt new things on the placement
- I now understand more about what engineering is
- I now have a better idea of what engineers do

- It has made me think about the potential for my students to follow engineering as a career
- I'd recommend TIPS to other teachers

Expected impact of the placement on teachers and schools

Do you feel that you now know more about engineering and careers in and related to engineering than before the placement? Why do you say this? What specifically do you think you have learned/have a better understanding of?

Do you feel that you now know more about engineering/NATURE OF THE BUSINESS OF THE PLACEMENT more widely than before the placement? Why do you say this? What specifically do you think you have learned/have a better understanding of? Do you think you will build a long term relationship with the company? Why do you say that? How do you think this will work? What sorts of activities do you think could take place?

How, if at all, has the placement experience helped you and/or your school more widely to understand more about engineering and the wider opportunities in engineering and manufacturing more generally?

Why do you say that?

How, if at all do you expect to use the experience in your teaching or your wider role at your school (e.g. as a form tutor or when pupils ask questions about careers)? What do you think the barriers are to this being realised?

Wider impact

Are there any wider benefits to the school of taking part in TIPS? What are they?
PROBE FULLY

Do you work with other schools? Do you think that you will disseminate your experience to them?

Would you advise them to get involved in TIPS?

The future

Do you think that your school would send other teachers on placements like this? Why is that?

Would you personally want to be involved again? Why is that?

Do you think that you will stay in contact with the company and work together in any way in the future? IF YES: How do you think you might work together?

Thank and close

Is there anything else you would like to say?

Is it OK to come back to you if I have any further questions?

I would like to visit your school after the October half term and talk to you again and to some of your colleagues, including your head of science. I will be in touch nearer the time to arrange a date.

Teacher interview – School Visit 3 months after placement

The interviewer and the respondent will have already met at the end of placement presentation and one interview has already been conducted by phone as part of this evaluation.

The length of the interview has been determined so that the interview can be completed within one lesson period.

Introduction

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS.

Everything that you say will be treated confidence but because this is the pilot and only a few teachers have been involved it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about TIPS from your point of view. Following on from our earlier discussions, I would like to focus on what has happened since you returned to school after the summer break.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

As before, I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 30 minutes.

About the respondent

Has anything changed in your position here at XXX school, since we spoke in July? E.g. have you been promoted, been given extra duties, changed the year groups or subjects you are teaching? IF YES: Do you feel that any of these changes are the result of taking part in TIPS?

Experience of the placement

Now that you have had some months to reflect, overall, how successful do you feel that the placement was?

Do you feel that you got the most from your time at the company? Why do you say that?

What more could the company or the National Science Learning Centre have done, if anything, to help you get more out of it?

What more could you personally or your school have done, if anything?

Impact to date of the placement on the placement teachers and students

How, if at all have you used the placement experience in your lessons? PROBE FULLY FOR DETAILS AND EXAMPLES

What barriers, if any, have you had to overcome to be able to do this?

How have your students reacted to this? PROBE FOR DIFFERENCES BETWEEN YEAR GROUPS, BOYS AND GIRLS, ETC

IF RELEVANT: How, if at all have you used the experience in your wider role at your school (e.g. as a form tutor or when pupils ask questions about careers)?
PROBE FOR DIFFERENCES BETWEEN YEAR GROUPS, BOYS AND GIRLS, ETC

How have your students reacted to this? PROBE FOR DIFFERENCES BETWEEN YEAR GROUPS, BOYS AND GIRLS, ETC

What barriers, if any, have you had to overcome to be able to do this?

Have there been any wider impacts on you personally?

Impact to date of the placement on the school

Have you been able to disseminate what you learnt to other teachers in the school?

What have you disseminated? PROBE FULLY

How have you achieved that? PROBE FULLY, ASK FOR EXAMPLES

How have they reacted? PROBE FOR POSITIVES AND NEGATIVES

How, if at all, has the placement experience helped your school to understand more about engineering and the wider opportunities in engineering and manufacturing more generally?

How, if at all, have you been able to disseminate this to the students?

Wider impact

Are there any wider benefits to the school of taking part in TIPS? What are they?
PROBE FULLY

Do you work with other schools?

- IF YES: Have you been able to disseminate your experience to them?
 - IF YES: How have you done this? How, if at all, have they used this information?
 - IF NO: why not? What have been the barriers?

Has there been any further contact with the company?

- IF NO: why do you think that is?
- IF YES: What form has that taken?

Do you think that the school will be able to build a long term relationship with the company? Why do you say that?

- IF YES: How do you think this will work? What sorts of activities do you think could take place?

What are the barriers, if any, to working with the company now?

Thank and close

Is there anything else you would like to say?

Senior management team interview

The length of the interview has been determined so that the interview can be completed within one lesson period.

Introduction

As you know, this interview is taking place as part of the evaluation of the pilot phase of TIPS. The aim is to look at the impact on the school of one of your teachers taking part.

Everything that you say will be treated confidence but because this is the pilot and only a few teachers have been involved it may not be possible to provide feedback in the report without it becoming obvious that the views presented are yours. If this occurs I will contact you. Nothing will be included that will identify you without your agreement.

This is a very open interview and an opportunity for me to understand more about TIPS from your point of view.

Please answer in your own words and I will ask you to explain your answers in some cases. You do not have to answer all the questions and are free to terminate the interview at any time without giving a reason.

I would like to record the interview but I will also take some notes. The content of the interview will be heard only by the research team. The interview should last about 30 minutes.

About the respondent(s)

To begin it would be helpful if you/everyone could introduce themselves and their roles and responsibilities here.

Do you/does anyone have a background in science education?

Have you been on any CPD courses at the National Science Learning Centre in the past or used them for other members of staff?

Do you use Science and Engineering Ambassadors at the school? Why/why not? IF YES: What do they bring to the school?

Reasons for involvement in TIPS

Why did the school get involved in TIPS?

What does the school hope to gain from involvement, if anything?

How did you select XXX for the placement from other teachers?

Impact to date of the placement on the placement teacher

From your perspective, what do you think XXX has gained from the placement experience?

Is there anything you think s/he or the school/you as (part of) the senior management team could have done that would have enabled XXX to benefit more?

How has XXX's experience been useful to the school more widely, if at all?

Is there anything you think the school/you as (part of) the senior management team could have done that would have enabled the school to benefit more?

Impact to date of the placement on lessons and students

How, if at all has XX's experience been used in lessons by other teachers? PROBE FULLY FOR DETAILS AND EXAMPLES

How was this brought about?

What barriers, if any, had to be overcome for other teachers to use the experience in their lessons?

How have the students reacted to this? PROBE FOR DIFFERENCES BETWEEN YEAR GROUPS, BOYS AND GIRLS, ETC

Impact to date of the placement on the school

As a result of the placement, do you feel that there is now a better understanding about engineering and careers in and related to engineering among teachers? Why do you say this? What specifically do you think there is a better understanding of?

Is there any impact outside of the science team?

As a result of the placement, do you feel that there is now a better understanding about engineering and careers in and related to engineering among students? Why do you say this? What specifically do you think there is a better understanding of?

Wider impact

Are there any wider benefits to the school of taking part in TIPS? What are they? PROBE FULLY

Does this school work with other schools?

- IF YES: Has information been disseminated to them?
 - IF YES: How has this been done? How, if at all, have they used this information?
 - IF NO: why not? What have been the barriers?

Has there been any further contact with the company?

- IF NO: why do you think that is?
- IF YES: what form has that taken?

Do you think that the school will be able to build a long term relationship with the company? Why do you say that?

- IF YES: How do you think this will work? What sorts of activities do you think could take place?

What are the barriers, if any, to working with the company?

The future

What do you see as the longer term benefits to the school from this placement?

Do you think that one teacher from the school can be enough of an influence to effect change at the school level?

Do you think that your school would send other teachers on placements like this?
Why is that?

Thank and close

Is there anything else you would like to say?