



**Evaluation of the Improving Gender Balance
Programme**

Final Qualitative Report

for

**The Institute of Physics and
National Science Learning Centre**

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Evaluation of the IGB Programme

By

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of

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The responsibility for the content of this report rests with James Lambley & Associates.

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EXECUTIVE SUMMARY

This document is the final report of the qualitative evaluation for the Improving Gender Balance (IGB) Programme comprising three strands of pilot intervention: Strand A (8 schools) Strand B (8 schools) and Strand C (4 schools). The report is based on 17 school evaluation visits and 10 telephone interviews. Evaluation visits, depending on Strand and availability of staff and pupils, included interviews with the school programme lead and other teachers, group conversations with staff, and small group or pair discussions with pupils.

Aims and Interventions

The IGB trialled three sets of intensive interventions in the schools with the aim of improving significantly the number of girls progressing to A level Physics.

Strand A piloted interventions with Y9 and Y10 girls; Strand B piloted interventions with teachers; and Strand C piloted a whole school approach.

Interventions in all three strands were aligned with the aims of the Programme and the individual strand objectives.

Performance against Key Indicators

The Key Performance Indicator (KPI) for Strand A was: *'Engaged girls report increased awareness of gender issues and influences on subject'* with a target of 70%. The KPI was measured through the Pupil Survey, administered three times over the duration of the programme, by the question: "I can give at least 2 examples of gender issues in Physics/Science". This KPI was achieved (71% in March 2016). The figure increased from a baseline of 29% (Autumn 2014).

The Strand B KPI was: *'Teachers report positive impact on classroom practice'* with a target of 80%. This KPI was measured through three questions in the teacher questionnaire with an interim and final measure being taken. All three measures recorded progress from the interim to the final measure. On the main measure: "How effective do you think the IGB Programme has been/could be in helping

your classroom practice towards girls in Physics to date and in the future?", the target was achieved (82%). On the two measures pertaining to integrating careers in Physics into classroom practice; and integrating careers in Physics for girls into classroom practice, the final measures were 73% and 64% respectively, showing improvements of 23 and 24 percentage points respectively. While this is positive progress these results reflect the difficulties of integrating careers into everyday classroom delivery.

The KPI for Strand C was *'70% of teachers report increased awareness of gender equity issues'*. This was measured through three questions: "Speaking openly and honestly, how aware do you feel you about: gender equity/equality issues for students; in subject choice; and in careers choice". The target was achieved in all three areas from the outset:

1. for students- 79%
2. in subject choice – 91%
3. in careers choice – 91%

Furthermore there was improvement on all three measures throughout the programme: self-declared awareness of equity/equality issues in careers choice (18 percentage point rise from outset to finish of programme); in subject choice (13 percentage point rise); and in equality/equity issues for students generally (7 percentage point rise).

Impact and Outcomes of the Programme

The IGB programme at its heart needed to combat entrenched social norms. As stated in the Interim Evaluation Report, it is evident to teachers and to the evaluators that it is difficult for changes in the classroom to combat the entrenched societal beliefs, stereotypical career expectations, and peer pressure that have influenced girls since birth and which continue.

The positive outcome is that despite this, impacts on teachers and/or pupils (depending on strand) asserted to be

attributable to the IGB programme by interviewees have been recorded in all three strands.

The aim of the programme was to raise girls' uptake of Physics A level. Data from the quantitative surveys regarding girls' intention to carry on into Physics A level reveal that a limited impact has been achieved with an initial dip after the inception of the programme, recovering but not yet reaching initial uptake figures.

The data also indicate that Strand A had higher impact on participating girls compared to Strands B and C. However, Strand A girls receive more intensive intervention hence the number of girls participating is much lower than other strands.

Data from Strands B and C reveal lower intention to pursue Physics. However a greater number of girls are involved who experience the programme through changes in teaching content, methods and changes in culture.

It may be argued then, that Strand A has a higher impact on a limited number of girls while Strands B and C have a greater impact on school uptake because the spread of the programme is wider in these strands (scalability).

Strand A

To echo this conclusion, while most (not all) Strand A schools were happy with the intervention, the majority stated that they thought the strand was too narrowly focused to have a major impact. In successful Strand A schools, moves are being made to include Strand B content.

There was evidence to show that Strand A had an impact on participating girls' confidence and on their awareness of gender issues. Both teachers and girls have stated that these impacts are attributable to the IGB programme. Girls and teachers were able to list a range of transferable skills that the girls attained through participation in the programme which included critical/logical thinking; presentation skills; and practical skills.

There is less evidence to show increased awareness of careers, or of increased resilience.

Other impacts have been articulated by teachers including impacts on younger pupils, including primary school pupils; new ideas for engaging girls in Physics including experiments and other activities learned from the PO; wider impacts including use of data and the impact of unconscious bias work with the Project Officer on their own teaching practice.

To increase the impact of the intervention, a large proportion of the teachers in Strand A felt that a younger age group should be targeted (up to Y9). This view was also articulated by some of the participating girls. A significant proportion of the Y10 and Y11 girls consulted already had a clear idea of the courses, or types of courses they would take at A level. For most, this did not include Physics.

Furthermore, the intensive nature of Strand A raised issues of scale. Teachers viewed the Strand A pilot as an important but not sufficient tool to have significant impact on raising uptake in their schools.

Strand B

A minority of Strand B consultees in two schools stated that there had been an increase in A level uptake by girls. More thought that the intervention would significantly improve uptake in the long term as the changes in teaching content and style in classes of younger children percolated through the school.

Changes in teaching practice to promote girl-friendly Physics classes and in careers provision were evident in Strand B schools.

The vast majority of teachers stated that their Physics teaching was better; that discourse around the teaching of Physics in general and to girls in particular had increased, and that there were changed expectations and mindsets about the subject. Teachers stated that both girls and boys would benefit from the changes in their content and delivery.

An additional outcome of Strand B has been change in the leadership practice of

some Heads of Physics/Science. The power of use of data in analysing gender difference and changing delivery was raised by many. The impact of work on unconscious bias on improving teaching was raised by most teachers participating in Strand B.

Teachers state that there is more interest from girls in Physics and STEM in general.

Although there was evidence to show that careers input in lessons had increased, there was no evidence to show improved awareness of careers from Physics by girls.

Compared to teachers in other strands, in Strand B school Lead Teachers and other participating teachers were least likely to state that they thought another Strand would have been more suitable for their school in promoting A level take up by girls.

Strand C

There were reported increases in uptake of, and interest in, A level Physics by girls.

Additional positive impacts attributed to the Strand C interventions included: teachers' increased awareness of gender stereotypes; increased awareness by some pupils of gender stereotyping; increased awareness of gender atypical careers, and evidence of actions by staff and pupils to bring about changes in school culture.

Some Strand C Lead Teachers and closely involved teachers/school leaders have described the programme as 'transformational' for their own practice and in starting to change entrenched cultures in their schools.

Teachers report changes in the style and content of their teaching, and more self-reflection on their teaching with regard to gender neutrality similar to impacts in Strand B.

Other impacts include gender neutral language amongst staff and pupils and an increase in careers input. Similar to comments made in other strands, the power of using data to tackle gender inequalities and stereotypical option choice was raised by teachers.

Awareness of gender atypical careers may have increased but this has not yet transformed into an increase in awareness by girls of a range of careers available to them as a result of studying Physics.

Barriers and Fertile Ground

Common features that made schools fertile ground in which the IGB programme can flourish centre upon continued Senior Management Team support and involvement. Many of the areas cited as fertile ground were the obverse of the list of barriers.

Strand A

A key barrier to the implementation of Strand A continued to be lack of time both in the curriculum, breaks, and in the extra-curricular timetable. Other barriers include red tape (obtaining permissions etc.) and lack of back-fill or non-timetabled staff to help with enhancement and enrichment activities.

The beliefs and attitude of the Lead contact teacher have an impact on the success of implementation. Lead contacts have varying beliefs regarding the causes of gender imbalance relating to Physics. Having a positive lead who observes or participates in some of the interventions has a positive impact (particularly on sustainability), as does support of the senior team.

Good lines of communication and support with, and from, the PSHE/careers staff as well as keeping the same Lead Teacher enhance the programme's likelihood of success. Additional staff resource to complete forms and undertake administration for trips and other activities was instrumental in the success of the programme in some schools.

Strand B

Barriers to successful implementation of Strand B include: time constraints on teachers; lack of knowledge and capacity to deliver the careers content; availability of work placements/contacts with industry; and timescale of the programme being too short to measure changes. Staff changes were detrimental to the programme.

The involvement of both the programme Lead and Head of Physics/Science are needed from the outset before any change implementation programme is started. This consultation is necessary to ensure co-operation and buy-in from staff.

A positive staff learning environment and a culture of trust and continuous improvement are both necessary conditions for this strand's interventions to have an impact and to embed. The ability for Departments and their staff to tolerate some uncertainty about the programme prior to observation and consultation is also useful.

Consistency of staff involvement, particularly senior staff, is important to the sustainability of the programme. As is the case with Strand A, sustainability and impact are also likely to be enhanced if the intervention dovetails with curriculum changes and times when the Schemes of Work need revision.

Strand C

The key barriers to the successful implementation of the Programme in Strand C include lack of commitment of all staff to engage and to reinforce the programme across all departments; and issues with the dependence on the strong leadership required to drive and maintain a whole school approach.

Availability of time remains a barrier: Strand C teachers and Leads commonly stated that they needed additional time to devote to the programme. Concerns were expressed about the timescale (too short) of the intervention to achieve the required breadth and depth of change. Timetables and limited capacity have forced 'rationing' of interventions. Some schools deliberately focused the scope (e.g. not working with parents) as part of their change management process.

Implementation of Strand C can also be hampered by having to push culture change in departments that may not be as responsive or as ready within the timescale.

Pre-requisites for success of the whole school approach include strong leadership from a powerful school leader; whole SLT

support to address gender imbalance for boys and girls; and an open and trusting environment in which to experiment and to work towards continual improvement. Increase in success through higher staff buy-in has been seen when the programme has used the banner of 'gender equality' and when seen to be undertaking interventions to address issues for boys as well as for girls.

Strand C concerns itself with culture and stereotypical assumptions. Within the process deep-rooted societal imbalances in nomenclature may have been overlooked by practitioners embedded as they are in their own societal culture (for example the widespread use of Sir/Miss in most schools).

The programme seems to work better when there are multiple members of staff who work across the whole school involved in driving the programme forward. These members of staff include, for example, PSHE and 6th Form leads, and Heads of Teaching and Learning.

In this whole school approach, there are pockets of resistance, areas in schools where change is less evident, and staff who have not yet signed up to the aims of the programme. Particular attention might be given to PE departments where it seems gender stereotyping, inequality of opportunity, and worse has been reported by girls in all three Strands.

Learning Points from the IGB Programme

It has been evident that all three strands in the pilot have had positive outcomes. We recommend that any future implementation has elements from all three strands incorporated into the approach.

The programme may have more impact (particularly in Strand A) were it targeted at a younger age group.

Enhanced work with primary schools to improve science delivery and enhance the understanding of and interest in science and in Physics in particular would be beneficial including the use of mechanisms tested in Strand A.

Strand A, working with younger girls and working in co-operation with Primary schools will have a long term impact but will be less scalable (wide) than Strands B and C.

In general, Strands B and C are more 'difficult' to implement if the culture is not open to change. For Strand C, good communications and a structured working network/group also seems necessary. We recommend the use of the very effective unconscious bias work as a starting point to bring about willingness to change.

Furthermore, Strand B may be used as the 'early win' or as a 'Trojan Horse' to engage the rest of the school (as well as realise the early benefits of changed Physics teaching). The messages about enhanced tools to deliver gender neutral or girl friendly lessons which are beneficial to girls and boys should be welcomed particularly if unconscious bias work has taken place.

At the same time, using the Strand C approach of full engagement from the SLT for a long-term programme of culture change should be used from the outset. Quick wins will help the long term strategy of combatting entrenched areas of gender stereotyping, such as some PE departments. Focus on both boys and girls should be encouraged.

'Rationing' the interventions within a long term plan will ensure the programme does not suffer from burn out. Working with cross-school staff in PSHE, with Learning and Curriculum Leads and ensuring a clear message from all school leaders will be beneficial.

The importance of an 'external eye' was expressed in Strands B and C. How this is accomplished in the sustainable model is unclear as neither internal mentors nor 'rival school' mentors may suit. Partnerships between schools may be the solution.

Careers interventions remain problematic and a call for more appropriate work placements was made by many schools.

Girls often obtain good or better results in Physics compared to boys at GCSE. However it is the case that they obtain

even better grades in other subjects that might influence subsequent A level choice. It is therefore this issue that might have to be addressed when trying to persuade girls to take up Physics rather than performance relative to boys.

To ensure Physics is treated on a 'level playing field' the transferable skills gained from its study should be marketed as well as the specific careers that are kept open to its students at A and degree level; e.g. Why study Physics? Why study History?

To help a combined approach we suggest groups of schools work in partnership including satellite primary schools. In primaries, a guided learning process is also recommended but ensuring that Physics is clearly labelled so pupils know what its study includes.

1 INTRODUCTION

This report provides results from the independent evaluation of the Improving Gender Balance (IGB) programme. The IGB programme is a Department for Education funded programme led by the Institute of Physics and National Science Learning Centre.

1.1 About This Report

Throughout this report, the following conventions have been followed:

- IAG - Information, Advice and Guidance
- IGB - Improving Gender Balance
- IOP - Institute of Physics
- KPIs - Key Performance Indicators
- KS - Key Stage
- PO - Project Officer
- PSHE - Personal, Social, and Health Education
- SLT - Senior Leadership Team
- SMT - Senior Management Team
- SoW - Scheme(s) of Work

Some quotations from the interim phase are included. Interim results are labelled 2015.

Where quotations and verbatim comments are relevant to more than one area of the report, these quotations and comments may be repeated.

1.2 The IGB Programme

1.2.1 Aims and Objectives of the Programme

The aim of the IGB programme as set out in the evaluation brief is:

To trial a series of intensive interventions in 20 schools aiming to improve significantly the number of girls progressing to A level Physics.

The Key Performance Indicators (KPIs) set for the Programme are shown in Fig. 1.

Figure 1: Key Performance Indicators

	KPI	Annual Target	Date
1	Strand A: Engaged girls report increased awareness of gender issues and influences on subject	70%	May 2015, March 2016
2	Strand B: Teachers report positive impact on classroom practice	80%	March 2015, March 2016
3	Strand C: Teachers report increased awareness of gender equity issues	70%	March 2015, March 2016
5	Implementation allows us to identify whether interventions have an impact on girls' choice of Physics at A-level.	Conclusions on which of the interventions have potential to increase the number of girls choosing Physics	March 2016 (part a); February 2017 (part b)

1.2.2 Pilot Approaches

Strand A: 'Tackling confidence and resilience'

Two Project Officers (POs) piloting specific interventions to address the findings that girls lack confidence in their ability to excel in A level Physics working primarily with female students from Years 9 to 11 in eight schools.

Strand B: 'Girls and the Physics classroom'

Two POs working with teachers to modify their pedagogy and classroom management during Physics lessons in 8 schools to implement recommended approaches to develop gender-aware pedagogy and classroom management, embed careers messages into lessons and to develop a model for practical work that engages girls.

Strand C: 'School Culture'

POs embedded in four schools in which gender balance messages are reinforced across multiple subjects for two days a week per school. POs to establish a whole school protocol that encourages teachers in all subjects to counter gender stereotyping effects. POs will work to effect institutional change on the issue of gender stereotyping in pupil subject choice.

1.3 Overview of Evaluation Methodology

There are two distinct elements to the evaluation: self-completion surveys of both school leaders/teachers and also of pupils; and a qualitative investigation into the IGB programme through face to face visits and qualitative telephone interviews. The content of surveys and qualitative questioning differed according to the strand of the programme in which the school participated:

- Strand A: 8 schools – interventions with Year 9 to Year 11 girls
- Strand B: 8 schools – interventions with teachers
- Strand C: 4 schools – whole school approach.

1.3.1 Surveys with Subject Leaders/Teachers and with Pupils

Three waves of quantitative surveys (not reported in this document) were launched by email to schools enrolled on the programme in all strands. The first wave took place in autumn term 2014 followed by the interim wave in summer 2015. The final wave of surveys was completed in spring term 2016. Schools that joined late received the appropriate surveys after they signed up. A core set of questions was used in for all strands with specific additional question sets designed for each strand. More variation in questioning was possible in the teacher surveys compared to the student surveys: the latter being limited to two sides of A4 only. Email reminders and a telephone chase were used to improve the number of responses as well as reminders through Project Officers contact. Figure 2 below shows the number of responses to the survey by target group.

Figure 2: Survey Response Counts

Strand	Baseline		Interim		Final	
	Teachers	Students	Teachers	Students	Teachers	Students
Strand A	50	306	19	85	13	116
Strand B	36	351	30	315	33	350
Strand C	158	264	52	249	45	247

Population numbers were requested but not provided by most schools hence response rates are unavailable

1.3.2 Qualitative Evaluation

As specified in the initial evaluation brief, the focus of the IGB evaluation is the qualitative work, despite the relatively large scale quantitative surveying used to gather KPI data. All schools enrolled in the programme were due to be consulted during the programme both through a telephone interview and a visit.

Visits and telephone interviews were organised through requests sent by email usually with an additional request for participation in the quantitative evaluation surveys. It is unethical and is indeed impossible to force participation, and the MRS Code of Conduct is clear with regard to the right of participants in research being able to withdraw. In addition, schools have many challenges to face on a daily basis, and teachers have extremely crowded diaries. Evaluators with the help of Project Officers sent repeat requests sensitively using both telephone and email follow up (evaluators), and email and visits (POs), not always successfully.

Evaluative visits included consultations with relevant pupils in small groups or in pairs. Strand A and B visits included interviews with participating Physics/Science staff, and Strand C interviews were conducted with staff from as wide a range of departments as possible. Telephone consultations were conducted with the Lead Teacher for the IGB programme.

All schools received either a visit or participated in a consultation interview (see Fig. 3).

Figure 3: Qualitative Evaluation

Strand	Total Visits	Total Telephone Consultations	Total
Strand A	8	5	13
Strand B	5	4	9
Strand C	4	1	5

2 PROGRAMME PERFORMANCE AGAINST KPIS

The table below presents the IGB programme's performance against the Key Performance Indicators (see Fig. 4).

In addition we have reported against additional indicators that also reflect the aims of the programme (see Fig. 5).

Figure 4: Performance against Key Performance Indicators

	KEY PERFORMANCE INDICATOR	TARGET	DATE		
			Autumn 2014 Baseline If available	March 2015	March 2016
1	Strand A: Engaged girls report increased awareness of gender issues and influences on subject*				
	I can give at least 2 examples of gender issues in Physics/Science	70%	29%	60%	71%
2	Strand B: Teachers report positive impact on classroom practice	80%			
2.1	How effective do you think the IGB Programme has been/could be in helping your classroom practice towards girls in Physics to date and in the future		N/A	53% to date 60% future	82% to date 79% future
2.2	In helping you integrate careers in Physics in your classroom practice to date and in the future		N/A	50% to date 60% future	73% to date 67% future
2.3	Helping you integrate careers in Physics for girls in your classroom practice to date and in the future		N/A	40% to date 43% future	64% to date 60% future
3	Strand C: Teachers report increased awareness of gender equity issues	70%			
3.1	Speaking openly and honestly, how aware do you feel you about: gender equity/equality issues for students?		72%	79%	79%
3.2	Speaking openly and honestly, how aware do you feel you about: gender equity/equality issues in subject choice		78%	77%	91%
3.3	Speaking openly and honestly, how aware do you feel you about: gender equity/equality issues in careers choice?		73%	71%	91%

*Strand A measurements include girls who did not take part in the full programme

The performance indicator for Strand A was set as: 'engaged girls report increased awareness of gender issues and influences on subject'. There has been substantial progress

against the indicator during the programme with the target of 70% being achieved in the final evaluation.

The target for the main measure in Strand B - ‘helping your classroom practice towards girls in Physics to date and in the future’ - has also been achieved (82% achieved to date against a target of 80%). The measures pertaining to careers content in lessons have shown marked improvement through the programme but fall short of the target 80%. The qualitative evaluation provides context to these quantitative findings with teachers stating they found it difficult to integrate careers material in lessons for a variety of reasons. While these particular KPI targets were not met there has been an increase of twenty-three percentage points in teachers stating that the IGB programme has helped them integrate careers into Physics lessons. A greater percentage point rise from the interim to final evaluation is evident for ‘integrating careers information for girls into Physics lessons’.

While teachers were somewhat sceptical in the early stages of the programme about its potential to have a positive impact on classroom practice (with relatively little difference between their perceptions of immediate and potential impact), by the final survey the majority (at least two thirds for each measure) felt the programme had been helpful to date. Teachers’ future predictions for the potential positive impact on classroom practice is a little lower than for current impact, perhaps suggesting an expectation that new skills/practices may slip backwards after the termination of the programme and if the focus is taken off gender issues (especially without the regular visits from Project Officers). Teacher survey comments support this supposition.

In Strand C during the year between spring 2015 (interim evaluation) and spring 2016, final evaluation) teachers’ perceptions of their own awareness of ‘gender equity/equality issues in subject choice’ and ‘gender equity/equality issues in careers choice’ have improved – from just over 7 in 10 feeling ‘fairly’ or ‘very’ aware, to more than 9 in 10. The results have surpassed the target throughout the programme.

The main aim of the IGB is to increase take-up of Physics A level by girls. Figure 5, below, shows results from the quantitative surveys regarding intention to carry on into Physics A level.

Figure 5: Performance against Additional Indicators

	ADDITIONAL INDICATORS	TARGET	SURVEY DATE		
			Autumn 2014*	March 2015	March 2016
Strand A:	I will carry on to take Physics A level (Agree or Strongly Agree)	None	15% (Base 306)	13% (Base 85)	14% (Base 116)
Strand B:	I will carry on to take Physics A level (Agree or Strongly Agree)	None	11% (Base 351)	6% (Base 315)	9% (Base 350)
Strand C:	I will carry on to take Physics A level (Agree or Strongly Agree)	None	10% (Base 264)	6% (Base 249)	8% (Base 247)

*Baseline

Results from pupil surveys in all three strands suggest that in the early stages of the interventions, pupils’ reported intention to take up A level Physics saw a minor decline (from baseline measurement to interim). This decline may indicate several things including: a teenage reaction against a perceived pressure from teachers and Project Officers; or differences of attitudes in the cohorts measured. By the end of the programme, it appears

that this negative reaction was fading and the reported likelihood of take-up of Physics at A level was approaching the baseline levels. However, the true impact on A level take up (and continuance) will only be seen in years to come. A simple spike in intended take up would serve a limited purpose if girls did not complete A level courses and have successful academic outcomes from that study.

When looking at impact by strand, data from Strand A indicate a higher impact on participating girls. There are important differences in the number of girls targeted in Strand A compared to Strands B and C: There is a lower base for Strand A since 'participating' students are those who are working intensively with POs. In the other strands, participating students are those in the relevant year groups who experience the programme through changes in teaching content, methods and changes in culture. It may be argued then, that Strands B and C have a greater impact because the spread of the programme is wider in these strands.

3 STRAND A

This section presents the results of the qualitative evaluation with Strand A schools. The interventions through which Strand A addressed A level Physics take-up by girls were delivered through working with a small group of girls in each school. Work with these girls aimed to:

- Improve girls' confidence and resilience
- Instil greater understanding of, and willingness to discuss, gender stereotyping
- Provide greater knowledge of careers leading from study of Physics along with enhanced belief that women and girls can and do undertake these careers.

3.1 Background, Process and Interventions

Two Project Officers worked with two groups of four Strand A schools: one group of four in the North East region, and one group in the South West. The eight selected schools participated throughout the entire programme (unlike Strand B).

At the beginning of the second term of operation, two schools in the South West re-launched their programmes with new sets of pupils (in different year groups) due to difficulties in delivery, including a clash with Duke of Edinburgh Award activities.

One teacher who came into post during the programme stated she did not have the confidence of the previous group and re-launched the group. Two Lead Teachers stated that they thought more structure was required from the outset, although they had an understanding that the IGB is a pilot project.

At the launch of the programme, there was some confusion in a few schools about the year groups with which the POs might be working. Although this initial confusion was clarified very quickly, one school in particular seemed to use the lack of clarity at the outset to undermine the programme.

In the second year of operation, schools either continued with the same groups of girls or re-recruited to replacement groups as successful groups of Year 11s moved on.

Similar to the first year of the programme, most Lead Teachers were extremely familiar with the interventions undertaken with the participating girls. Some teachers had remained with girls, others had not. In a small minority of schools the teachers were not fully engaged - one through indifferent support from the beginning of the programme and one who was fully supportive but was new in post.

Schools took different approaches to populating the intervention groups. Some schools (with the PO's help) advertised it as an opportunity for girls to improve CVs etc. Other schools 'picked' girls to attend the groups. The majority of groups were held in breaks or after school but some groups in the North East were held in class and/or PSHE time.

"It's a well-planned programme".

Lead Teacher, Strand A school, 2015

"It's gone really well. My idea of the project changed as we went along. At first I thought of it as a Physics project. It's more about PSHE".

Head of Physics, Strand A school 2016

“It’s not taken off – it needs an inspirational lead; nothing had been sorted at the start and things changed at the start. It was hidden behind confidence building – those without confidence didn’t go – first it was about Physics”.

Head of Physics, Strand A school 2016

As stated above, Lead Teachers took varying approaches to the recruitment of the IGB groups: some were voluntary, others were selected. A minority of teachers stated that the voluntary approach naturally resulted in a group self-selected with higher confidence.

“...growing by word of mouth. It is the more able type of girl who is involved, more articulate and more interested in the social aspect than Physics”.

Lead Teacher, Strand A school 2015

“Two girls have definitely benefitted, they’re in the top set anyway. One is very into rights for women, a feminist, and the other one is a nice kid who knew the PO. They have got a lot out of it”.

Head of Physics, Strand A school 2016

The interventions used in the schools have been, unsurprisingly, similar. The range of activities provided by the POs was aligned with the aims and objectives of Strand A. These interventions included:

- Work on gender imbalance and gender stereotyping, discussions, presentations of materials and mini research projects
- Activities to build confidence and resilience
- Specific presentation skills with increasing ‘exposure’
- Work about careers in Physics/science
- Other skills to increase confidence – such as presentation skills and ambassador training; building objects/science experiments
- Planning and delivering Physics-related activities for and in primary schools
- Enhanced activities e.g. to nearby Science Learning Centres/University Departments, and ‘I’m a Scientist, Get me Out of Here’ – live web chat activity
- Careers evenings/open events with parents.

“There have been a lot of activities – it’s been really broad and not focused entirely on Physics but also that understanding and awareness to raise confidence even if they don’t love Physics”.

Lead Teacher, Strand A school 2016

3.2 Outcomes

The aim of the programme is to increase A level take-up by girls and, to recap, the Strand A pilot was to do so through working with girls to increase their confidence and resilience; promote greater understanding of, and willingness to discuss, gender stereotyping; and to provide greater knowledge of careers from Physics. The interventions, discussed above, were aligned with these aims and objectives. This sub-section of the report discusses whether or not the outcomes of the Strand A pilot achieved these aims and objectives.

3.2.1 Impact on A Level Take-Up and on Perceptions of Physics

The results of the quantitative surveys regarding the impact of Strand A on girls’ uptake of Physics are inconclusive (see above). The qualitative evaluation also provided inconclusive evidence regarding impact on girls’ intentions about studying Physics beyond GCSE.

According to some teachers (including Heads of Science and Physics) the intervention has had a definite impact on the proportion of girls taking Physics. Others state that where there has been a positive change in numbers of girls going through into A level, it can only be correlated with the programme.

"I think some are changing their minds about the future and might be considering it [Physics]".

Lead Teacher, Strand A school 2016

"Next year we have four or five girls out of sixteen [choosing Physics A level], in the prior year there was only one... the change is because of the programme and the increase in enthusiasm".

Head of Physics Strand A school 2016

Some teachers state that it will have an impact on girls who have not ruled Physics out, but have not made a final choice. This view has been supported by a small minority of participating girls.

"I have chosen to take it [Physics] at A level. I was 50:50, it has helped".

Y11 Girl Strand A Triple Science 2016

The view of a significant minority of qualitative interviewees was that it was too early to tell what impact the strand's interventions would have. These comments were from Lead Teachers in schools that had worked with younger age groups.

"We can't measure it now! It's too early".

Lead Teacher, Strand A school 2016

"It needs to be more long term [to measure] it will be interesting to see what happens when the current Year 10s go to sixth form. We targeted Year 9 as they pick options if you target later then it is too late. With the current Year 10s even if they don't pick Physics it's not because they don't think they can do it, it's opened their eyes, the choice is there".

Head of Physics Strand A school 2016

"I think the programme improved girls' confidence and awareness of stereotyping. The link to Physics wasn't very prominent. So I would say possibly, because we have more confident girls who are less likely to be influenced by stereotyping, but whether this results in more girls taking Physics, it is too early to tell".

Verbatim comment from teacher survey, Strand A school 2016

A minority of staff, both those who are enthusiastic and supportive of the programme and one who was not stated that the programme as delivered through Strand A had no or very little impact on girls' uptake of Physics. It is interesting to note that all of these individuals were able to comment on the many other outcomes of the programme and the obvious impacts on the participating girls (see Section 3.2.2 Confidence and Resilience).

"Not sure that the project has changed the intentions of the girls involved this time, but am optimistic about the possibility of increasing numbers in the future if a more whole-school approach is taken".

Verbatim comment from teacher survey, Strand A school 2016

"We have been working with older girls but by the time they get to GCSE year they already had a firm idea [of A level choice]. The extra confidence boost might have pushed them into thinking 'why shouldn't I?' It's probably helped them [those who

have already decided to take Physics] be more assured and potentially go on to Physics degrees”.

Lead Teacher, Strand A school 2016

“I don’t think it has made any significant difference, due to the small number participating, and that some female students who intend to do Physics next year were not interested in the sessions.”

Verbatim comment from teacher survey, Strand A school 2016

“Our Year 11 girls have definitely met the aims – they’ve been fully engaged with practical work, and there has been an increase in enthusiasm [for Physics]”.

Head of Physics, Strand A school 2016

Despite the many impacts attributed to the IGB Strand A intervention articulated by teachers and girls (see below), many teachers have stated that the impact of the strand could only be limited.

“It’s going to have a small impact because of the small number of students involved, but what has happened is high impact on those small numbers”.

Lead Teacher, Strand A school 2016

“If I were to be critical of Strand A, by itself it won’t increase uptake dramatically but it is an important part of the solution – it had an amazing impact on those 12 girls...Strand A with a core set of girls creates strong advocates but Strand A in isolation won’t have a long term impact”.

Head of Physics Strand A school 2016

“It [the Programme] has a very concentrated effect on the girls involved – so it’s narrow”.

Head of Physics Strand A school 2016

Thus, according to most of these teachers, Strand A remains a useful but not sufficient tool to have significant impact on raising uptake.

3.2.2 Raising Confidence and Awareness of Gender Issues.

This sub-section explores the success of Strand A interventions to meet the objectives of raising confidence and resilience, and of awareness of gender issues. All teachers with one exception stated that the girls in their groups had grown in confidence as a result of the programme.

The evidence of the improved confidence of participating girls most cited by participating teachers has been the girls’ ability to stand up and give presentations to bigger (and more alien) audiences. The girls were exposed to increasingly difficult presentation tasks resulting in presenting to a large adult audience at conference. The girls involved were also rightly proud of their achievement. The improved confidence was noticed by teachers in the girls’ participation in class.

“They are growing in confidence. They had been reluctant to be seen to be involved, for example just being seen doing activities. But they have now enjoyed activities. It’s not just because it’s Physics”.

Lead Teacher, Strand A school 2016

“When the girls did the projects, such as going into primary schools and presenting at the Durham event, I felt this had significant impact on their confidence. These were the most valuable aspects of the course”.

Verbatim comment from teacher survey, Strand A school 2016

“The most pleasing aspect is to see growth of confidence. For example two girls in Y10 science were fairly quiet and wouldn’t get involved and took a back seat, but now they have got more confidence and have changed their attitude to science positively...they are more pro-active in seeking help [in Physics], before they wouldn’t have asked”.

Lead Teacher, Strand A school 2015

“I never liked science – and I haven’t changed much but I’ve gained confidence and it’s given me reinforcement on creative careers”.

Y11 Girl Strand A Double Science 2016

“I feel their confidence has improved but whether it’s because I know them better and they are opening up more. However they have developed analytical thought and presentation skills, and the ability to speak to adults”.

Lead Teacher, Strand A school 2016

“‘Teamworking’ ‘more confident’ ‘can lead a group’ ‘it’s taught us we can do anything really’”.

Group of 4 Y11 Girls Strand A Double Science 2016

“Two of the girls who were most resistant [to the IGB programme] were the best at the Ambassador training.”

Lead Teacher, Strand A school

The qualitative evaluation provided evidence from teachers and participating girls regarding increased awareness of gender issues as well as the acquisition of a range of different skills.

“Before I’d never realised there was a gender gap, it introduced the idea to me”.

Y11 Girl Strand A Double Science 2016

“Leadership, presentation skills and it opens your eyes to issues of gender”.

Y9 Girl Strand A Triple Science 2016

“X [PO] challenges the gender assumptions. Through discussions there are some whose viewpoints have changed about gender ...they don’t see it as a male subject”.

Lead Teacher, Strand A school 2016

“I think the programme improved girls’ confidence and awareness of stereotyping. The link to Physics wasn’t very prominent. So I would say possibly, because we have more confident girls who are less likely to be influenced by stereotyping, but whether this results in more girls taking Physics, it is too early to tell”.

Verbatim comment from teacher survey, Strand A school 2016

“The students have fixed ideas like around gender bias in jobs. One had an idea and the group erupted into fierce debate - they were arguing but they weren’t correct. Y [PO] has kept putting the seed of doubt in, gently challenging. When asked later in the programme, the group had changed their minds”.

Head of Science, Strand A school 2016

The qualitative evidence points to the IGB Strand A having significant impacts upon the participating girls in terms of confidence and gender awareness. There was limited evidence to show increased appreciation of careers pathways from Physics.

“Now they know lots of careers but I am not convinced they will change their minds”.
Lead Teacher, Strand A school 2015

3.2.3 Wider Impacts

This subsection examines the impacts that Strand A has had beyond the articulated aims and objectives of the strand and any impacts beyond the small groups of girls participating. These impacts range from new thinking and learning styles in participating girls, to impact on the teachers that have been involved, and on boys. In addition, trickle down impacts on the primary age children with whom Strand A girls worked have been noted.

“It’s made me think more logically”.
Y9 Girl Strand A Triple Science 2016

“Learned what it is like to be put in a group that actually works”.
Y10 Girl Strand A Triple Science 2016

Participating girls and teachers in some schools noted the effect that the Science Ambassador activity in primary schools had on the primary age children.

“They (Year 5 and Year 6 primary pupils) remember it, it’s positive them getting realistic expectations and that it is not too hard for them. They are already quite set that there is a big gap... biased ideas about what careers men and women do”.
Head of Physics, Strand A school 2016

“If it stopped now it would fade away to nothing but now it’s starting to have a knock on effect – to boys too”.
Head of Physics, Strand A school 2016

The purpose of Strand A was working with girls to improve their confidence, but for some teachers there were knock-on effects. Some teachers who participated or sat in the sessions valued the new and fun ideas and experiments that POs demonstrated, or have a renewed appreciation of the use of school data.

“She’s [PO] brought....ideas for experiments like the head in a vacuum. And new gadgets and experiments”.
Lead Teacher, Strand A school 2016

“It’s been eye opening for me. The PO also acts as a Physics specialist here”.
Head of Science, Strand A school 2016

“Thinking about unconscious bias and a whole school issue of data – and using it. So girls’ achievement at GCSE Physics is as high as boys and boys are underachieving at English”.
Head of Physics, Strand A school 2016

3.3 Fertile Ground and Barriers to Success

Evaluation consultees were asked what barriers the IGB programme had encountered to date, and what barriers might undermine successful implementation of the programme. In addition the evaluators were keen to investigate whether schools had any particular features that might make ‘fertile ground’ for this type of initiative to succeed.

Barriers

All teachers consulted could name at least one barrier that has impeded progress, or has limited the success or full implementation of the programme.

The following list of barriers have either been articulated by participants or extrapolated from comments by the evaluators throughout the programme:

- Red tape – e.g. permissions and forms for trips
- Targeted age group – many participating teachers and girls think the intervention is targeted too high up in the school (see Section 3.3)
- Lack of 6th form
- Lack of time in the school day to run a group (shortened breaks)
- Staff in other departments undermining girls through their gender bias
- Non specialist staff not feeling confident and having negative attitudes to the subject
- False starts and difficulties at outset of programme caused by lack of clarity about the programme and its target groups (causing drop off in attendance)
- Lack of commitment or full understanding by lead staff in school
- Staff turnover, maternity leave, sickness (leading to reduced confidence by girls in their Physics teacher and their own progress)
- Budget (including budget to backfill for staff involvement)
- Lack of communications about the IGB programme in school to keep the SLT involved
- Small scale of intervention
- Structural impediments – e.g. lack of scientific background of career staff.

The large majority of the teachers continued to state that time has been the greatest barrier to implementation and potentially to the continuation and success of the programme in their school. These concerns include both teacher time for organisation and future input, and lack of suitable times in which to timetable IGB sessions within or outside of the curriculum. A minority of schools use science lessons. Most schools use time outside of lessons – a resource that seems to be increasingly squeezed.

“We’ve used PSHE days and at lunchtime hours but next term it’s down to fifty minutes”.

Head of Physics, Strand A school 2016

“...We are a very large school; the provision for extra-curricular activity is 2 slots. So the girls have been torn as they have other things like sport. And in the timeslots available, as there is a humungous academic push, in these same slots they sometimes have to do extra lessons”.

Lead Teacher, Strand A school 2015

“Participation was affected because Duke of Edinburgh was on the same night”.

Lead Teacher, Strand A school 2016

For rural schools in particular, after school convening of the session is problematic. For all schools, competition with other extra-curricular activities including sports and drama in free time is fierce.

Some teachers put the cause of a failure to attaining the main aim of the programme squarely with the Strand A intervention itself (also discussed in Section 3.2 Outcomes, above). However, there is one Strand B Lead who would have preferred the Strand A intervention. Many teachers and some girls were concerned that the intervention is directed at pupils who have already been 'put off' or lost confidence and that it would be more advisable to get the girls 'earlier'. Some teachers went so far as to say that there would be no effect on this target cohort of girls in relation to the main aim of the programme (more girls taking Physics A level), but that there might be potential long term positive outcomes for the primary school children for whom the girls are Ambassadors.

"It would be possible to run an extra-curricular club but a bigger impact would be with teachers: CPD with teachers".

Head of Physics, Strand A school 2016

"I think by the time you get to Y10 it's too late. The PO has only worked with the Y11 top set – they're good enough already".

Head of Physics, Strand A school 2016

Staff from other departments and non-specialist staff were mentioned as a barrier undermining the programme. This was mentioned as an adverse consequence of Strand A not being a whole school approach. In addition, and a barrier that has been mentioned across all Strands, is the institutional concern of paucity of careers IAG, and the concerns about the background of teachers and careers professionals providing the IAG. Lack of a 6th form affecting progression was also a concern of some teachers in schools lacking the facility.

"I have had feedback that some tutors have said things to the girls like 'Oh it's really hard you know, even my sons can't do it".

Head of Physics, Strand A school 2016

"An issue is the other teachers, especially from biology, who are teaching out of specialism, they have negative attitudes to the subject. Obviously they are professional people, it's because it is quite hard".

Head of Physics, Strand A school 2016

"The careers leads and advisers aren't graduates of science and they often unwittingly provide inappropriate advice for example about EPQs (Extended Project Qualification)".

Head of Physics, Strand A school 2016

"I have been told by girls in this school that they have been told Physics is for boys".

Head of Physics, Strand A school 2016

"There's no responsibility here to A level, just get them their GCSEs".

Lead Teacher, Strand A school 2016

There has been one negative voice about Strand A throughout the course of the evaluation from one Lead Teacher and Head of Physics. This lead has cited the difficult start to the programme and has developed negative views of the PO. This individual also has deep seated views about nature and nurture which may run counter to the programme (which is not to say this professional does not encourage and motivate girls into Physics).

“It’s not taken off – it needs an inspirational lead; nothing had been sorted at the start and things changed at the start and it was hidden behind confidence building – those without confidence didn’t go – first it was about Physics”.

and from the same source:

“There’s not really been anything to take forward……The science stuff I might use; and the ambassador training which they go and use in a primary school”.

Head of Physics, Strand A school 2016

Fertile Ground

A menu of characteristics that has made ‘fertile ground’ for this type of intervention to be successfully implemented is listed below. These are characteristics either directly mentioned by involved teachers or derived from analysis of a range of interviews by the evaluators.

- Pro-active Lead Teacher with inquisitive brain and energy who also time to devote to the project and adapt it to their own school’s circumstances
- Understanding and appreciation of the root issues driving the project
- Having non-teaching staff/administration staff to support enrichment activities e.g. administration of permission slips; being able to accompany participating girls on trips.
- Very keen/supportive SLT – often science or Physics trained
- High level of academic achievement
- Commitment to gender equality and/or science achievement in the school.
- Good relationship between SLT/Lead Teacher
- Good relationship and trust between Lead Teacher and PO
- Communication skills/relationship building of Lead Teacher with other staff including PSHE and careers delivery staff
- Spare capacity within the school within timetable/curriculum and belief that the programme is a priority
- Good links with local primary schools

3.4 Sustainability

During the qualitative evaluation all teachers were asked whether the intervention in part or whole would be continued in their school and, if so, how.

Some schools have already started recruiting to their new groups, proving the intention to continue the programme in some form. Recruitment has been an issue through the programme and has seen mixed results. Although more than one school has struggled to recruit girls to the group once the former participants had moved on, in one school targeting Year 9s, the participation has risen from 20 last year to 39 this year with 13 of those attending the previous year deciding to remain Science Ambassadors.

In one case, the sustainability was written into the new Lead Teacher’s performance management plan, so a group, doing similar activities, will be continuing.

In another the Head of Physics is pushing forward with some of the interventions that cross over into Strand B, and is investigating other Strand B content.

“I have started looking at the content for Strand B and am developing a transition plan from Year 9 to Year 10 – mindsets and am now thinking about a careers module. It’s

hard to plan into lessons so I will do a whole module. They know the reason they're learning it, the purpose behind it".

Head of Physics, Strand A school 2016

"There are sustainable elements, for example the core group of girls could be advocates. Some of the girls are expecting to go onto Physics in 6th Form so this is an opportunity to use them as role models and to work with younger students. Also we'll use some of the ideas in the future in PSHE lessons and use lots of the activities e.g. to address gender issues, run like a girl etc.; their research recreated in primary schools was inspiring and thought provoking".

Head of Physics, Strand A school 2016

Areas of the programme which some teachers thought they would be able to continue include:

- Inclusion of some of the interventions into Schemes of Work
- Integration of careers information into lessons
- Careers information being written into Schemes of Work
- "Scientist chat" ('I'm a scientist, get me out of here' or equivalent)
- Recruiting girls to be advocates using those who have taken part in the Ambassador programme to pass on the skills to younger girls in school and/or to maintain the link and the intervention with the primary schools.

One Lead Teacher has been implementing his sustainability scheme since the first year of the IGB programme including the following elements:

- Embedding girls' confidence/resilience work into PSHE
- Writing elements of the IGB into the Science Faculty Improvement Plan which will then form part of the School Improvement plan
- Writing staff targets into their appraisal targets which dovetail from the Improvement Plan
- Taking the programme to a 'whole school' activity which is budgeted, along with inset and CPD
- Instilling greater understanding of, and willingness to, discuss gender stereotyping
- Providing greater knowledge of careers leading from Physics and encouraging the belief that women and girls can and do these careers

A high proportion of Lead Teachers stated that they would like to sustain the intervention to some degree with a significant proportion wanting to widen out the programme. A significant minority stated that they would find it difficult to continue any part of the programme without support with the barriers cited linked to those set out in the barriers section above.

- Insufficient support (financial and time)
- Inability to be involved in any of the delivery (thereby not being able to replicate in the future or write detailed plans in Scheme of Work)
- Lack of or insufficient evidence to show the programme is successful
- Changes in timetabling including shortened break times.

However, it seems that the majority of Lead Teachers are in the process of, or planning to, set up some form of continuation to the project in varying scales. Those teachers who are planning significant interventions want to adopt parts of Strand B and Strand C interventions.

3.5 Suggestions from Participants on Raising Girls' Uptake of Physics

All teachers and students participating in the programme were asked whether they had any other ideas about raising girls' participation in A level Physics.

In the final phase of qualitative evaluation, it was evident that participating staff and pupils had been able to step back and view the impact of the programme before they made their suggestions. Hence, when asked for other suggestions on raising uptake of Physics by girls, responses returned to a focus on the intervention itself. Many comments concerned the age of IGB participants and the focus of activity.

Even the minority of teachers who thought that the intervention was targeting the correct age group in school, felt that widening the programme to undertake activities with younger age groups would be beneficial. As stated in previous sub-sections, this view was also articulated by many girls.

"Moving forward, the ideal would be whole school – bits and pieces of everything, drip-feeding of messages and changing culture".

Head of Physics Strand A school 2016

"You have to influence them young enough, from Year 7 – start the whole ball rolling and gendered views of the subject start earlier, for example in Primary School".

Lead Teacher Strand A school, 2016.

"It needs to be a longer term project to have an effect – also start younger at KS3, by the time you're in Year 10 and Year 11 you've already made some choices".

Y11 Girl Strand A Triple Science 2016

"I think they should be younger [participants in the programme] – start should be in Year 7".

Y11 Girl Strand A Double Science 2016

"We encouraged younger ones but there was no-one older for us – and I would do it with the middle sets and with younger girls".

Y11 Girl Strand A Double Science 2016

Other comments included suggestions on role models and ideas for the careers element of the programme

"Students should see more people in the field. We don't do work experience. They need role models".

Lead Teacher Strand A school, 2016.

"More pictures of female scientists. When you look at science books it's all men".

Y9 Girl Strand A Triple Science 2016

"Stop making gender balance patronising, it becomes an overdose. Also the more you tell someone they can do anything they feel suspicious".

Y9 Girl Strand A Triple Science 2016

“When you think of Physics you think of astronauts and men – all those jobs, even though we know women can do those jobs, girls still don’t think like that when choosing (A levels). We need to get women from each profession to show we can work at those jobs and get them to come into schools”.

Y9 Girl Strand A Triple Science 2015

Across all Strands, girls suggested that better teaching in primary school was the answer:

“I only learned what Physics was in Year 8. They never told us, and at primary school it was only the basics – it wasn’t good enough. We should do more – you don’t know the answers in secondary school”.

Y9 Girl Strand A Triple Science 2015

Strand A Summary and Conclusions

- Strand A has had limited impact on raising girls' uptake of Physics A level
- A significant proportion of the Year 10 and Year 11 girls consulted had already a clear idea of the courses, or types of courses they would take at A level. For most, this did not include Physics.
- There is some evidence to show that girls who had already been thinking about Physics may have had their confidence to take the subject boosted, and had gone on to choose Physics.
- There is no evidence of a strong link regarding enhancement of confidence and gender balance issues having a strong impact on Year 10 and Year 11 girls choosing Physics.
- Limiters to the success of Strand A are twofold: the age of participants and scale of the intervention. First, a large proportion of the teachers consulted felt that the programme was addressing the issues too late in the school lives of the pupils and that a younger age group should be targeted (up to Year 9). This view was also articulated by some of the participating girls. Poor teaching of Physics at primary school was raised as a concern. Second, the intensive nature of the programme raises issues of scale. Teachers viewed it as an important but not sufficient tool to have **significant** impact on raising uptake.
- There was evidence to show that Strand A had an impact on participating girls' confidence and on their awareness of gender issues. Both teachers and girls have stated that these impacts are attributable to the IGB programme.
- There is less evidence to show increased awareness of careers, or of increased resilience.
- Other impacts articulated by teachers include impacts on younger pupils, including primary school pupils; new ideas for engaging girls in Physics including experiments and other activities learned from the PO; wider impacts including use of school data and the strength of impact of the unconscious bias work on teaching .
- A review on selection of girls for inclusion in the project should be undertaken depending on the aims of any future intervention.
- If older girls (Year 10 and Year 11) are selected then perhaps those who are unsure about selecting Physics (or perhaps other Science A levels) rather than those who have definitely dismissed the possibility might be considered. For this type of group then confidence building and Ambassador Training for work in their own school as well as raising confidence through fun activities and Enrichment activities would be ideal. If girls who are not interested in taking Physics are admitted to the group then Ambassador training to work in primary schools might enable some change but benefit the younger age groups.
- Variation in recruitment of participants is evident. Some schools invited girls to attend voluntarily, others have selected girls to participate (with some choosing those less keen on Physics and others choosing students who might be more likely to choose Physics). Focusing on those girls who have not definitely ruled out Physics or who are thinking about taking other sciences might lead to higher impact, particularly when working with younger girls.
- One of the main barriers to implementation of the Strand A programme continues to be time in the curriculum or time for extra-curricular activity. Other barriers are red tape (obtaining permissions etc) and lack of back-fill or non-timetabled staff to help with enhancement and enrichment activities.

- Sustainability of the programme is likely to be enhanced if the intervention dovetails with curriculum changes and times when the Schemes of Work need revision/re-writing. Sustainability of the programme is compromised when the teacher is not involved with the sessions, or when the timetable undergoes modification – leading to clashes and to more restricted break time.
- The beliefs and attitude of the lead contact have an impact on the success of the running of the programme. Lead contacts have varying beliefs regarding the causes of gender imbalance relating to Physics.
- Many Lead Teachers thought that the focus and scale of Strand A was too narrow to have a significant impact on girls' uptake of Physics.
- Work with primary school age children was suggested by some teachers and girls, as were whole school and Strand B approaches.

4 STRAND B

This section presents the results of the qualitative evaluation of Strand B schools. The pilot intervention by which Strand B aimed to improve A level Physics take-up by girls was delivered through working with teachers to achieve the following *inter alia*:

- Improvement in pedagogical approaches for girls including questioning, gender neutral examples and effective practicals for girls
- Promotion of effective group work and higher engagement
- Provision of greater knowledge of careers leading from study of Physics.

4.1 Background and Interventions

Two Project Officers (POs) have worked with eight Strand B schools in two regions: one group of four schools in the Eastern region, and one group in the Yorkshire and Humber region.

In Strand B there were some recruitment and retention issues during autumn and spring terms in the Academic Year 2014/2015. During this time, two schools withdrew from the project requiring replacement schools, one of which joined the programme significantly later than other schools in the IGB programme.

Strand B interventions require more consultation with and observation of staff at the outset to determine the existing practice and the perceived and actual needs of the teaching staff. In one case, the school had been a partner school on the Stimulating Physics Network programme and was accustomed to working with IOP staff on pedagogy.

Interventions delivered have included:

- Attendance and contribution at departmental team meetings
- CPD sessions for science staff
- Observations of lessons by the PO with detailed feedback to individual teachers
- Work with technicians on set up of practicals
- Careers tools/knowledge/ideas
- Girl-friendly and gender neutral teaching examples, including weekly tips for teachers
- Help with practicals and examples for specified areas, including ways to boost girls' confidence through practicals
- Suggestions for amendments to SoW.

4.2 Outcomes

The aim of the IGB Programme is to bring about positive change to the number of girls who choose to take Physics A level. In Strand B the aim is delivered through the following objectives: to improve pedagogical approaches for girls; to promote effective group work and higher engagement and to provide greater knowledge of careers leading from study of Physics. The interventions, discussed above, were in full alignment with these aims and objectives. This sub-section of the report discusses whether or not the outcomes of the Strand B pilot achieved these aims and objectives.

As stated in the Interim Evaluation Report of this Programme, it is evident to teachers and to the evaluators that it is difficult for changes in the classroom to combat the entrenched societal beliefs, stereotypical career expectations, and peer pressure that have influenced girls since birth and which continue. However, despite this, impacts on teachers and pupils have been noted in this strand.

4.2.1 Impact on A Level Take-Up and on Girls' Perceptions of Physics

In qualitative interviews teachers and Heads of Science/Physics were asked whether the IGB programme had had, in their opinion, any impact on the number of girls in their school choosing to continue the study of Physics to A level. In some schools without 6th form provision, teachers are unsure about the final choices of their Year 11 students for A level study. Despite this, teachers in a range of Strand B schools stated that in the long run there would be an increase in A level uptake attributable to the changes implemented as a result of the programme. Many were unsure, however, as to the extent of the programme's success in promoting a higher proportion of this particular cohort of girls to continue to Physics A level. There was more optimism about the impact of the programme on Physics uptake among Strand B teachers than among those working in Strand A.

One reason for the uncertainty about the impact of the strand is the small numbers choosing Physics in the first place and the innate differences in cohorts with swings in choices between A level subject choice observable from year to year. However, there was also optimism amongst these same teachers about the long term impact of the programme on A level uptake by girls.

"I know that we will have a higher proportion of girls in Physics and in AS Physics. It's the best percentage I have ever seen – but it is small N".

Physics Teacher, Strand B school, 2016

"It's hard to measure what the impact on current girls taking Physics is: Long term, definitely yes [increase in uptake]".

Physics Teacher, Strand B school, 2016

"Yes, it will increase the uptake of Physics [by girls]; it won't change the girls who have to battle against parents/society but those who are open minded are changing their thinking about it, and it might change, and it might have an impact on those who didn't think about it [taking Physics]".

Head of Science, Strand B school, 2016

"It will be interesting usually we get about 2 girls out of 14 [in Physics A level]; we are now looking at 3 to 4 out of 15 – unusual. But the option blocks are stopping some".

Head of Science, Strand B school, 2016

"I can't say I do [notice impact on take-up] ...the Year 9s haven't chosen their options yet. The lack of increase in uptake so far isn't the fault of the IGB intervention but the timescale isn't reasonable, it will take longer as the non-specialists are teaching lower in the school and the impact won't hit until later".

Head of Science, Strand B school, 2016

Some Lead Teachers felt that the timescales of the programme were too short to be able to measure impact; however, few teachers felt that the intervention was too short, unlike the experience of many Lead Teachers in Strand C.

"It needs longer for measuring the impact. The timescales for the intervention are OK but the impact will be later".

Head of Science Strand B school 2016

“In terms of raising take-up, the timescales aren’t reasonable – it will take longer, it won’t hit till later...I might not teach light and sound for a year”.

Lead Teacher Strand B school 2016

In contrast to Strand A, girls in Strand B are one step removed from the intervention so it is harder for them to comment on the impact of the programme upon them and upon their views of Physics. Evaluators asked the girls a series of questions about Physics to assess views of the subject and the way it is taught rather than asking about changes in teaching styles in Physics about which they could not have any comparative viewpoint. In the interim report, the evaluators observed that many girls’ views of Physics were negative or gender-biased and that there was a long way to go to change these views. In the final phase, there were also negative and gender biased views about Physics expressed by girls.

“Physics doesn’t appeal really – it appeals more to boys. They go into things like engineering - it’s not a girly thing”.

Y9 Girl Strand B Triple Science, 2015

“Physics is more practical: boys are more hands-on”.

Y11 Girl Strand B Triple Science, 2016

“I am going to take Physics A level and Degree – I am not sure what career I want, I just like it”.

Y11 Girl Strand B Triple Science.2016

“I prefer biology because it’s really interesting; Physics is hard”.

Y9 Girl Strand B Triple Science, 2016

“There’s more ‘leeway’ in the non-science subjects...more opinions etc.”

Y10 Girl Strand B Triple Science, 2015

4.2.2 Other Impacts on Girls: Higher Engagement and Greater Knowledge of Careers

Teachers reported that girls are more engaged, motivated and interested in Physics and Science generally as a result of the programme.

“The Year 9s and 10s, I think they seem more motivated by STEM....it’s not limited to Physics”.

Physics Teacher, Strand B school 2016

When asked to present examples of how girls are more ‘engaged and interested’ leading to the supposition that more girls will take Physics A level, teachers offered the following explanations:

“It does seem that there is more interest from girls, for example we had more interest at the Open Evening”.

Lead Teacher, Strand B school 2016

“More than half of the sign up for the Big Bang trip are girls: That’s really unusual”.

Physics Teacher, Strand B school 2016

“I’m a scientist get me out of here – we had a bigger interest from girls”.

Physics Teacher, Strand B school 2016

“Year 9 and Year 10s are more engaged; it’s a nice change to have to stop girls talking and their conversation is about Physics”.

Lead Teacher, Strand B school 2016

“I’m a Scientist – they loved it. It generated conversation, both positive and negative. One girl asked about gender balance unprompted”.

Lead Teacher, Strand B school 2016

The fact that girls complained that they had a lack of knowledge about jobs and careers was reported in the Interim Report, and is evident in other Strands in this final phase of the evaluation. This lack of knowledge continues but we know from careers related research with children and young people that knowledge about careers is often not retained particularly if it is information about a career in which the young person has no interest or about which the context is not understood.

“We know with other sciences what we can do [careers] but we don’t really know what we can go into [with Physics]”.

Y11 Girl Strand B Triple Science.2016

“I am going to take Physics A level and Degree – I am not sure what career I want, I just like it”.

Y11 Girl Strand B Triple Science.2016

“I don’t know any careers that might want Physics”.

(after which another participant pointed out the careers board)

Y9 Girl Strand B Triple Science, 2015

“There are such a wide range of subjects – e.g. medicine you need Biology Maths, Chemistry – there’s no room for Physics”.

Y11 Girl Strand B Triple Science, 2016

“Physics isn’t needed as much”.

Y11 Girl Strand B Triple Science, 2016

There have been concerted efforts in some schools to promote a ‘career of the week’ and other methods of improving girls’ knowledge of potential careers available after a study of Physics. However, it is a fair reflection to say that science teachers in all Strands struggled with this aspect of the programme. The fact that the efforts to include careers was not picked up by some pupils is not unusual and reflects the difficulty of presenting careers materials (students often forget the fact that they have had careers interviews or specific careers interventions) and also reinforces the need to embed careers materials into lessons so that the careers elements are linked to specific areas of study.

Furthermore, there are two messages that need to be highlighted regarding careers from Physics to establish a level playing field with other subjects. First is the fact that Physics provides a high calibre qualification with extremely transferable skills that can be used in many careers. Very few pupils in English or History lessons ask what careers they can go into. Second, that there are many careers in which the specific study of Physics is required which are not limited to engineering or to ‘being a Physicist’. It seems that these messages are still not getting across to pupils even in this programme.

4.2.3 Impact on Teachers: Pedagogical Approaches

Further to the effects on girls' uptake of A level Physics, teachers were asked whether they had noticed any impact of the IGB interventions on their own or on their colleagues' practice that they could wholly or partially attribute to the IGB programme. As stated above, Strand B aims to improve pedagogy, instil gender neutral/girl-friendly teaching of Physics, and to increase awareness of careers. These interventions, if successful, are the mechanism by which an increase in girls' uptake (see above) will improve, but also have an impact on the culture, and the sustainability of the programme's work within schools.

Positive impacts from the IGB programme have been observed by all Strand B teachers/Heads of Department who participated in the programme across the areas of teaching content; practice/pedagogy and careers provision, including:

- Introduction of more and more interesting practicals and examples in lessons
- Improvement in the quality of Physics teaching
- Better set up/more successful practicals (through work with staff and technicians)
- Changes in teaching styles and language to be more gender neutral in class
- Use of more gender neutral examples in teaching and gender neutral teaching styles
- Increased confidence in teaching in general and in certain topic areas
- Increased discourse between staff about gender awareness
- Awareness of trying to include careers examples in lessons/increase in careers examples; use of careers boards
- Changed atmosphere/mindset – acceptance of changes, e.g. in SoW
- Increase in STEM activity
- Awareness of, and change in, expectations in class of boys and girls, including in practical work
- More organised SoW with practicals and careers content
- Changes in Department Heads' styles of leadership
- Different methods of 'selling' Physics.

Teachers were asked to provide examples of impacts of the programme on their teaching quality and content:

"[The PO has been an agent for change: we can improve the experience for girls and for everyone – It's all about good science teaching. It's just made us better teachers".

Head of Science, Strand B school 2016

"It's definitely improved the quality of our Physics teaching".

Head of Science, Strand B school 2016

"X [fellow teacher] and I have started concepts first and then equations to express them – it makes it more accessible. So instead of writing an equation and thinking that's Maths, if you go into the concept first then write the equation that 'goes with it' then they say 'oh alright, it's a tool'".

Physics teacher, Strand B school 2016

"You lose track and fall into a routine. [Now] we make it relevant – what's the point? Why do we teach it? Once you've started seeing the point you enjoy teaching it, and it's good for the students to pick it up".

Head of Physics Strand B school 2016

"It's the only subject-specific feedback I've had in four years; the teaching and learning feedback from the Assistant Head is great, but they're not a scientist".

Head of Science, Strand B school 2016

"I did a Year 7 lesson [energy], it went badly. She [the PO] came and helped deliver the same lesson with me. I feel confident doing it now and I have examples....I found that amazingly helpful and I feel confident delivering that session".

Non-specialist Physics teacher, Strand B school 2016

Teachers found including the careers content more difficult. Despite this, some teachers are attempting to include examples in their lessons.

'She [PO] wanted careers in every lesson. I found that difficult, really hard. She's been keen to progress that but we have not really".

Head of Physics, Strand B school 2016

"With careers...the staff we have don't have the knowledge...a big barrier is knowledge".

Head of Science, Strand B school, 2016

"I never considered telling them about careers in Physics but quite honestly I didn't know much about it – I knew about engineers but what about all the other jobs like physios etc.?"

Lead Teacher, Strand B school 2015

"Yes there has been a change [due to the programme], we are now talking about careers".

Teacher, Strand B school 2015

Examples of more gender neutral/girl-friendly approaches and content were also provided:

"I thought I was good! But I was more boy-friendly [prior to intervention]"

Head of Science, Strand B school 2016

"[The observation and feedback] it has made me think about how I was presenting, selecting people, selecting groups and I have changed the way I teach".

Head of Science, Strand B school 2016

"We are splitting classes with the girls at the front. It's had a good effect on them answering questions and participating in practicals – before the boys would do the practicals and the girls would write the results...and the girls are calling out [answers]"

Head of Physics Strand B school 2016

"It's been really useful – tremendous: My whole objective is to enthuse boys and girls. It's been a really positive experience. I didn't used to think about the way I spoke, use of language; or about dominant boys. Now I think about when I ask questions I actively ignore dominant boys, use less [sic] male centred examples, and use they and she more when I speak".

Physics teacher, Strand B school 2016

“I didn’t think of gender issues so they were probably male gendered lessons...now we are doing ‘Think, Pair, Share’. Before it was boys shouting out, I just thought the girls weren’t interested. It’s a good technique for boys too”.

Teacher, Strand B school 2015

“It’s surprised us how ingrained some of these things [unconscious gender bias] are in us and our teaching practice. We need to change and it’s not a quick fix”.

Head of Physics Strand B school 2016

“Yes the programme has definitely had a positive impact. What we are trying to achieve is a mindset change and it will take more than 18 months to see change”.

Head of Science, Strand B school 2016

“I was the most cynical because I wanted things to be equal but the way I was teaching, language and other things weren’t. Now I am still biased but towards promoting girls at the minute, trying to even it up”.

Physics Teacher Strand B school 2016

“The PO observed that we were praising boys more for less in-depth answers because the girls were better in my class”.

Physics Teacher Strand B school 2016

“In Year 9 I asked how they would consider buying an appliance, and I used a DIY tool, hairdryer and microwave using power/time”.

Lead Teacher, Strand B school 2015

“We arrange practicals so that pairs of boys or pairs of girls work together, so that boys can’t take over, and girls have to get hands on and discover what they can do”.

Lead Teacher, Strand B school 2015

4.2.4 Other Impacts

Evaluators asked participating teachers about any additional impacts on their teaching or school further to those identified by the aims and objectives of the Strand. A high proportion of the consultees stated that the confidence of teachers had improved. Many also stated that discourse about Physics content and teaching was higher amongst science teaching staff.

“It’s had more impact on morale and confidence of staff than on pupils YET”.

Head of Science, Strand B school 2016

“Many more people have come to me to discuss Physics – it’s raised the profile. They are much more positive and I have many more conversations about Physics, and how to teach this or that”.

Head of Physics Strand B school 2016

“Our confidence has increased. If the curriculum changes we will be able to change with it”.

Non-specialist Physics teacher, Strand B school 2016

‘I know I am bringing it [new approach] into more teachers and students through PSHE, and will work with student teachers or on learning walks”.

Physics Teacher Strand B school 2016

Heads of Science/Physics and teachers in at least two of the more successful schools in Strand B have talked about a change of culture and leadership in their Departments. This was not an explicit aim of this strand (see Strand C) but indicates a greater ability to embed the changes experienced as a result of joining the programme.

“Yes [There have been other outcomes], it’s changed the culture. And she [PO] has shown me a new way of being out there and promoting Physics and demo-ing, sharing good ideas...”.

Head of Physics Strand B school 2016

“What she’s been good at is raising the profile and being very positive about Physics”.

Head of Physics, Strand B school 2016

Furthermore, two Lead Teachers have talked about the whole school approach explicitly. One teacher explained that she took two non-Physics members of staff (member of SLT and another involved in careers planning) to the IGB conference to engage more in a whole school approach. Since the conference this Lead has reported that there is more engagement with SLT.

4.3 Fertile Ground and Barriers to Success

Teachers were asked whether they thought there were barriers to the potential success of the programme in their school, or whether they thought there are conditions in their school which constituted ‘fertile ground’ in which the programme could flourish.

In the second and final round of qualitative evaluation of the programme, evaluators wanted to ascertain whether barriers to the implementation of the programme in its initial stages remained and whether new barriers emerged. The evaluators wanted to see if there were any patterns to these barriers to the successful implementation of the programme and whether there were any common features in schools in which the programme seems to have run more successfully.

Barriers

Barriers to the implementation of Strand B articulated in the final phase of evaluation include:

- Time constraints to implement programme or to meet the Project Officer
- Staffing issues
- The timescale of the programme being too short to see/measure impacts
- Availability of opportunities like work placements and links to industry
- Concerns about boys’ performance in other subjects affecting views of IGB and its focus on girls in Physics
- Curriculum - too much content
- The type of content in Physics
- Knowledge and capacity to promote the careers element of the programme
- Geographical isolation preventing work placements and other work and science related experiences
- Knowledge of the intervention from the outset.

Barriers from the interim phase which were NOT mentioned in this phase:

- Issues with trainee staff
- Low level behaviour problems from boys disrupting classes
- Personalities of other teachers in department who don’t buy into the programme or its aims

- Lack of engagement with careers staff/PSHE
- Merely nominal SMT support.

In the interim phase of the evaluation Strand B teachers commented on staffing issues more than those in Strand A, largely as Strand B is focused on teachers and teaching. This remained a strong theme in the final phase of the evaluation. Those schools which, in the interim evaluation, expressed problems of staff turnover and/or shortages due to maternity, illness and career moves largely did so in this round of evaluation. These staff issues were cited as factors that undermined the success of the IGB.

‘It’s impossible to recruit, we are at a minimum two sometimes three teachers down....It’s a shame there have been these issues. It will have affected the impact on increasing Physics uptake. It’s not the fault of the IGB, it’s issues in the school and department’.

Head of Science, Strand B school 2016

Finding time in which to allow space for the programme was also commented upon by teachers and Heads of Department from a number of participating schools.

“Finding time to spend on it was difficult...it’s worked much better this year as we have timetabled CPD on a Monday every other week”.

Head of Science, Strand B school 2016

Schools mentioned lack of work experience opportunities. Some rural schools in particular feel that their geography works against them and what they want to do in relation to the IGB programme, particularly for Physics related experiences for students including work placements and trips.

“We are isolated...but we are setting up links with another school”.

Head of Science, Strand B school 2016

“Contacts in industry are required - women in science”.

Physics Teacher Strand B school 2016

“We need to be taking girls to see women out there....and we need work placements or links where we could offer placements”.

Head of Science Strand B school 2016

Working on a project like IGB with the aim of improving girl-friendly teaching and outcomes will encounter resistance from some quarters. Consultees reported that some staff had asked questions about boys’ participation and achievement. In all cases the positive impacts on staff teaching have been recognised and have led most teachers to believe that the intervention will have a positive impact through ‘better Physics teaching’ on boys as well as girls, with a differentially high impact on girls due to the gender neutral approach.

Furthermore from the outset of the programme one Lead Teacher in this Strand was not receptive to the intervention due to the impression it had been imposed on the Department by an enthusiastic Head Teacher. Hence the Lead Teacher (Head of Department) reported that the Department does not need the programme as the staff are young and enthusiastic, and are mostly female. The Lead stated that staff resented the time demanded by the Programme.

“Some staff at departmental meetings were saying ‘what about white British boys?’”.

Head of Department, Strand B Triple Science 2016

"It's all brilliant what she [PO] wants to do. She wants to use another hour in department meeting to show us things but there's no point. We need to get on with our agenda with what is pressing. It's about working smartly".

Teacher, Strand B school 2015

"When we did an exercise on your favourite female Scientist – there was male kickback, there are sexist attitudes from parents".

Head of Department, Strand B Triple Science 2016

The careers element of the programme, although embraced by some schools, was found difficult by many.

'She [PO] wanted careers in every lesson. I found that difficult, really hard. She's been keen to progress that but we have not really".

Head of Physics, Strand B school 2016

"With careers – the staff we have don't have the knowledge...a big barrier is knowledge".

Head of Science, Strand B school 2016

Both in the interim and the final phase of qualitative interviewing, several Strand B schools stated that they were unsure of what the programme was doing and how it was going to proceed. This concern may emanate from the nature of the Strand B intervention which depends on observation and consultation before a plan is agreed.

"Initially I didn't quite know what we were doing – there was no clear plan of action. It has evolved. And you always feel vulnerable with a stranger in your lesson but we have grown to trust her and realised that this is an expert who knows how to convey difficult ideas. I would have liked a clearer plan though".

Head of Physics, Strand B school 2016

Various teachers in Strand B commented on the packed nature of the Physics curriculum as well as the content, which is not as interesting as they think it should be. In addition, concerns about Maths and the differences with Maths teaching were raised.

"The syllabus covers a lot of electricity in Years 9, 10 and 11 – there's a bit of space and in Year 11 there's medical Physics, they love that, but that's going. It 'could' be interesting!".

Head of Science Strand B school 2016

"Maths - it's a big thing for girls.....girls worry about maths, boys don't. We are talking to Maths – we spend time teaching a whole lesson on re-arranging equations - a whole lesson in Year 11".

Head of Department, Strand B Triple Science 2016

"The main thing with my girls is the Maths...and I think it is confidence, they do seem to say 'I don't get it' when they do".

Lead Teacher, Strand B Triple Science 2016

Fertile Ground

The following list of pre-requisites to the project's success was compiled through comments from consultees and observation by the evaluators:

- Buy-in from the majority of staff in the department with a strong lead from the Head of Department
- Positive and open environment within the department and, sometimes, school enabling teachers to embrace self-reflection and observation by others
- SLT support
- Ability to tolerate a period of observation and consultation prior to planning
- Ability to create space for discussion and CPD
- Patience to win round sceptical members of the team
- Teachers with industry experience.

In the interim evaluation, areas mentioned included:

- Lead female teacher (suggested by male Head of Department)
- Previous contact with IOP through the Stimulating Physics Network programme thereby knowing how such programmes work and staff being receptive.
- Budget for back-fill.

"You have to be a confident happy department; the culture in the Science Department is open, honest and happy in sharing stuff: I go into lessons all of the time".

Head of Science, Strand B school 2016

4.4 Sustainability

In Strand B, sustainability of the IGB programme depends on continued use of methods to observe and feedback on teaching; on continued application of gender neutral and girl-friendly teaching of Physics; and of embedded careers information to provide a range of ideas about the application of Physics in the workplace.

There is much movement and optimism overall concerning embedding Strand B intervention content in participating schools. One of the ways in which the strand's objectives will continue to be addressed is through increased discourse of the issues between teaching staff – to keep the subject 'live' and through encouraging openness in enabling teaching to be observed. Another is to embed practicals, careers content, and new teaching content and methods into the Schemes of Work. Finally, work on the morale and enthusiasm of the teaching staff to make the subject fun and to keep confidence of staff high is required to sustain momentum. As seen above some of the pre-cursors are already present in participating schools (see Section 4.2 Impacts).

"Things have been put in place, including the practicals, and it's all in the SoW and we have an awareness of delivering more balanced lessons. It's well embedded already".

Head of Science, Strand B school 2016

"I will now put gender awareness as a standing item in my department and raise it as a focus for learning walks, and do a bulletin and put it in".

Head of Science, Strand B school 2016

"We are re-writing the Scheme of Work for the new specification so we will include careers and good practice and examples".

Head of Science, Strand B school 2016

“The Head has been supportive and it will all be written into the Department Improvement Plan”.

Head of Science, Strand B school 2016

“There will be a big jump in the new SoW and the way we teach. There will be much more careers, and concepts. Our [current] SoW is quite formulaic”.

Head of Science, Strand B school 2016

One barrier to sustainability is, as in Strand A, scarcity of time. The majority of teachers in Strand B state that they have noted an increase in discourse because of the IGB programme, precisely because participation provides a space for discourse. This space for development and reflection will only continue with strong leadership, and while the majority of Lead Teachers were extremely enthusiastic about the IGB, only two expressed views about their role as future leaders of the programme in school.

In the interim report it was stated that sustainability is likely to be strongly affected by the degree of impact seen within the programme lifetime by participating teachers. This final report shows that teachers are, in the main, positive about the programme and able to articulate the benefits accrued to their departments and pupils. As such, compared to Strand A, sustainability of parts of the programme should be relatively easy to maintain, for example through new and amended pedagogical styles and schemes of work.

“There are no negatives [to IGB] –everything has been positive. It’s motivated us to make it a priority, and make it accessible to everyone”.

Physics Teacher Strand B school 2016

4.5 Suggestions from Participants on Raising Uptake

Teachers and students were asked whether they had any ideas for increasing the number of girls taking A level Physics.

Several teachers and pupils stated that more role models and exposure to industry were needed. Some girls requested more careers information, something to which they should have been exposed as part of the intervention.

“Contacts in industry are required - women in science”.

Physics Teacher Strand B school 2016

“We need to be taking girls to see women out there....and we need work placements or links where we could offer placements”.

Head of Science Strand B school 2016

“We need more chances to see women doing their jobs – especially KS4 students”.

Y11 Girl Strand B Triple Science 2016

“Try to show a wider range of things you can do with it”.

Y11 Girl Strand B Triple Science 2016

“Need to see a wider scope of things you can do beyond stereotypical male jobs”.

Y11 Girl Strand B Triple Science 2016

“Engineering for girls enthused us for a while but we need it drummed in”.

Y10 Girl Strand B Triple Science 2016

Strand B teachers along with teachers in other strands advocated starting the programme with younger age groups to prevent girls from losing confidence in, and thence being alienated from, Physics early on in their school careers.

“Year 7s arrive in the school brimming with confidence about the possibilities for their future, believing that they can do anything, change the world. This excitement and enthusiasm has all but disappeared by the end of Year 8”.

Lead Teacher, Strand B school 2015

“Teach Physics lower down school – I remember being taught Chemistry but not Physics”.

Y11 Girl Strand B Triple Science 2016

A few girls expressed the view that there was too much content in Physics. This and perhaps the ambition of making Physics more interesting and fun, through practical work, has meant that some girls are put off by what they see as lack of time and clarity.

“In History it’s all neat and we can take all the notes; but in Physics we are rushed and we want to write it out”.

Y10 Girl Strand B Triple Science 2016

“At the moment there is too much copying from the board, too much writing things down”.

Y9 Girl Strand B Triple Science

“We get some things in great detail, but things you need detail for you don’t get it”.

Y10 Girl Strand B Triple Science 2016

“We need to know how it fits in and how we can apply the stuff – like music and sound waves”.

Y10 Girl Strand B Triple Science 2016

“Make it seem more fun”.

Y11 Girl Strand B Triple Science 2016

When choosing options, especially for A level subjects, girls make ‘rational choices’ about which subjects they perceive may be most useful and attainable for their future. Most want to take subjects in which they are confident they can achieve good grades and may avoid those where the grade is perceived to be more ‘risky’. Many Science/Physics teachers confirmed that girls tend not to be confident about their abilities, and to exhibit caution, whereas boys have a tendency to over-confidence in their abilities.

Girls taking Triple Science and expected to achieve good grades in the subject often discussed Physics as the third-choice science. Few girls were considering taking all three sciences even when aiming for a science-based career such as medicine and any inclusion of Physics was generally discussed with a degree of reluctance as a ‘necessary’ choice. In some cases, serious consideration was being given to taking Biology, Chemistry and another subject such as Psychology if this was felt to allow access to a desired degree course. Marketing Physics as not only interesting at A level, but a high quality subject offering a range of specific and transferable skills may have an impact.

“I have adopted now an approach where we sell Physics as a high kudos subject – promote the high kudos”.

Head of Physics Strand B school 2016

Summary and Learning Points: Strand B

- Strand B operates through working with teachers of Physics on pedagogy and content.
- A minority of Strand B consultees stated that there had been an increase in A level uptake by girls. More thought that the intervention would significantly improve uptake in the long term as the changes in teaching content and style in classes of younger children fed up through the school.
- Impacts against the specific objectives in Strand B have been observed.
- Changes in teaching practice to promote girl-friendly Physics classes and in careers provision are evident in Strand B schools.
- The vast majority of teachers stated that their Physics teaching was better; that discourse around the teaching of Physics in general and to girls had increased, and that there were changed expectations and mindsets about the subject.
- An additional outcome has been change in the leadership practice of some Heads of Physics/Science.
- Teachers state that there is more interest from girls in Physics and STEM in general.
- Girls state that they are still unaware of many careers stemming from Physics (despite obvious careers input from staff as a result of the programme). Careers information in general is rarely 'sticky'; Physics needs to be put on a level playing field with other subjects with the transferable skills to a wide variety of careers stressed as well as the promotion of careers specifically requiring the subject.
- Barriers to the successful implementation of the Programme in Strand B include: time constraints on teachers; lack of knowledge and capacity to deliver the careers content; availability of work placements/contacts with industry; timescale of the programme being too short to measure changes; Staff changes were also mentioned as detrimental to the programme.
- The Lead Teacher and Head of Department should to be involved from inception regarding any change implementation programme such as IGB. Early involvement promotes feelings of ownership rather than the alienation of a department which might feel imposed upon by the SMT or Head.
- A positive staff learning environment and a culture of trust and continuous improvement is a necessary condition for this strand's interventions to have an early impact and to embed. The ability to tolerate some uncertainty about the programme prior to observation and consultation is also useful.
- Consistency of staff, particularly senior staff, is important to the sustainability of the programme. As is the case with Strand A, it is also likely to be enhanced if the intervention dovetails with curriculum changes and times when the Schemes of Work need revision.
- In common with the views provided by Strand A teachers, a large proportion of the Strand B teachers felt that the programme may have more impact on younger girls.
- Strand B consultees were extremely positive about embedding the programme in their Departmental practice and culture and steps had been taken to embed work in SoWs.
- Some Strand B leads have stated that the Programme has changed the culture in their departments. The value of an 'external eye' was stressed by many teachers.

5 STRAND C

This section presents the results of the qualitative evaluation with Strand C schools. The approach taken in Strand C to improve A level Physics take up by girls was delivered using a 'whole school' approach to achieve the following objectives:

- School culture shows tolerance of non gender stereotypical choices
- Positive school culture towards gender equality
- Less gender stereotyped approach to teaching
- Better awareness of a range of careers from a range of subject choices.

Leaders of the programme in Strand C were reluctant for the IGB Programme to be perceived as an initiative aimed at girls, so wherever possible the intervention included boys and encouraged staff in girl-dominated subjects to increase the participation of boys albeit with an implicit acknowledgement that the ultimate aim was to increase female take-up of Physics. Similarly, 'whole school' was taken to include all year groups,

Of the four schools in Strand C two are undergoing major changes. One school in Strand C was undergoing leadership re-structure affecting leaders of the IGB programme and resulting in redundancies of senior staff who also happen to be leading the IGB programme. In another school a new Head Teacher is being appointed from outside school who succeeds an (internal) interim Head. The latter has been a great supporter of the programme: the new Head will be the fourth in quick succession.

5.1 Background and Interventions

Three Project Officers (POs) work with Strand C schools across the Eastern and South East regions.

A wider intervention than those of Strands A and B, Strand C is implemented across the school to change culture. Thus, it requires input to, and feedback from, staff within and beyond the Science or Physics Department. Project working parties have, in some schools, attracted participants from a wide range of departments, and efforts have been made to avoid IGB being seen as a Physics or Science initiative.

Interventions have included:

- Departmental pedagogy discussion time
- Observations of lessons across the school by teachers active in the programme
- Learning Walks through the school focussed on gender bias
- Teacher development sessions/resources on gender neutral language
- Gender neutral teaching and examples
- Working with girls/groups of students
- Careers tools/knowledge/ideas
- PSHE/Careers/Lifeskills interventions and programmes to raise pupil awareness of gender imbalance/gender neutrality
- Year group assemblies
- PO attendance at parents evenings, including Options Nights
- Whole staff presentations
- Thought for the day weekly emails from the PO
- PO's working lunches with teachers
- Work on wider policies such as behaviour to investigate and ensure gender neutrality
- Talks by external speakers such as former pupils (female) working in a Physics-related careers; Apprenticeship leaders; representatives of 'Great Men' and online links to a panel of scientists for video and web-chats.

- Teacher-led sessions such as ‘Great Women’
- Changes to imagery used in school to counter gender stereotyping.

It is evident that Strand C encompassed elements of both Strand A and Strand B (albeit less intensively administered) as well as a wide range of whole school interventions.

5.2 Outcomes

In Strand C the approach taken to promote a higher take-up of A level Physics by girls is through working to the following whole school objectives: promoting tolerance of non stereotypical gender choices in school; ensuring a positive school culture towards gender equality; promoting a less gender stereotyped approach to teaching and ensuring better awareness of a range of careers from a range of subject choices. The interventions seen in the schools were fully aligned with these aims and objectives. This sub-section of the report discusses whether or not the outcomes of the Strand C pilot achieved these aims and objectives.

Strand C is particularly ambitious and this is reflected in the passion and problems encountered throughout the evaluation. Within the relatively short timespan of the programme, it is difficult to implement a whole school culture change which runs counter to many entrenched societal beliefs, stereotypical career expectations, and peer pressure in a system of which the schools themselves are part. Despite this caveat, changes in practice and belief, and culture change in pockets within these schools was noted.

5.2.1 Impact on A Level Take-Up and Views on Physics

Two of the Strand C schools have stated that they have a higher female uptake of A level Physics than prior to IGB, while the remainder have had fluctuations. Similar to comments in Strands A and B, the potential impact of small cohort sizes and differences in cohorts upon A level take-up were raised by participating teachers.

“I do have 34 out of 66 males and it was 12% last year. There is an improvement and where we have seen this improvement it is correlation not causation”.

Assistant Head, Strand C school 2016

“We joined because we had a really small class of Physics in Year 12 two years ago, none of whom went into Physics – so it wasn’t just girls but overall. Then we had a Year 12 that was all boys before the approach by the IOP. This also coincided with staffing changes but we had a Year 12 class which was half girls – all of whom went on to Year 13 and who are all going into engineering. Then the next Year 12 group we were back to one girl – there are so many subtle social messages...”.

Head of Science and Assistant Head, Strand C school 2016

“Strand A makes the most difference. Strand C is just too big [in terms of tackling A level take-up]”.

Head of Science and Assistant Head, Strand C school 2016

“There have been changes in students – it’s unusual, 50% of the A level class is female”.

Head of Physics, Strand C school 2016

“Whole school, it’s not had no impact – it’s had impact in pockets but we need a bit more help to make it complete”.

Head of Science and Assistant Head, Strand C school 2016

"I would be interested in what the Year 8s are going to do. I would put money on more girls choosing Physics".

Head of KS5 English, Gifted Lead Strand C school 2016

"There is a raised awareness (of Physics). In a recent 6th Form open evening we noticed a big impact with the girls there and I did hear a couple of students who didn't attend talking about it, so there is something going on".

Head of Science Faculty, Strand C school 2016

"I think the teaching staff are more aware so there are more girls interested".

Head of Science Faculty, Strand C school 2016

"I think there will be progression into Physics but it will be slow, there was only one girl last year but there will be more if they had someone to look up to".

Girl in Equalities Leadership Group, Strand C school 2016

Strand C schools put emphasis in the early stages of the programme on reviewing and amending careers provision, both in terms of the key decision-making points for 'options' for future study, and at a wider, more aspirational level. This is a key way of using whole school structures for wider exposure.

"I have changed the content of the World of Work Programme both the content and I have changed how I might speak about things. I wouldn't have thought of a male nurse and breaking the cycle. I have changed the sorts of job I might mention in speaking to girl students and boys. It's engrained in you. So I think it is a deliberate change of mindset and that's why I think it will take time".

Head of Employability, Strand C school 2016

"I was keen to get involved with IGB and to work with the programme to discuss the avoidance of gender stereotypical assumptions with parents through parents evening before options are taken".

PSHE/Careers Lead, Strand C school 2015

As shown in Strands A and B, lack of awareness about the variety of jobs and careers available in general and especially using Physics knowledge and skills is acknowledged to be a significant threat to aspirations that will underpin increased take-up of Physics. When asked about the range of jobs in which Physics would be useful, a narrow range of suggestions were made, with girls making fewer suggestions than boys. Furthermore, few girls indicate interest in the types of careers with which they link the study of Physics. This was found to be the case in one school where girls thought that Physics inevitably lead to Engineering. It later transpired that there had been a 'push' on women in engineering the week prior to the visit. Remedial action was agreed to rectify the situation.

"The impact on students has been in an increase of knowledge of careers and career paths including non-stereotypical pathways like boys and midwifery; girls and engineering. There has been an increase in interest and engagement and they are more able to talk about non-stereotypical careers".

Head of KS5 English, Gifted Lead Strand C school 2016

"Pupils are increasingly career focused and know what subjects and grades they need to get to the jobs they want. That doesn't mean that we can't do a lot to inform them about things they might not come across, to encourage them to keep doors open that could close off interesting and rewarding avenues".

Teacher, Strand C school, 2015

“Physics sounds narrow, they tell us loads [of jobs] in Biology and Chemistry but if you asked me what jobs are there from Physics - it’s only engineer”.

Y10 girl, Strand C school 2016

“The programme has raised profile of STEM through science awareness”.

Head of KS5 English, Strand C school 2016

“We looked at engineering in form groups – the girls were mesmerised”.

Head of KS5 English, Strand C school 2016

5.2.2 Other Impacts on Pupils

POs in Strand C schools have worked with groups of pupils with the aim of raising awareness of gender stereotypes in line with the Strand’s objectives. In one school, for example, a whole student leadership structure has been created, mirroring the staff leadership structure. The structure includes an equalities group which the PO leads. Such groups have also provided opportunities for POs to work on confidence and other attributes with the participants. In Strand C there have been impacts on pupils’ awareness of gender stereotypes and gender balance. Girls who participated in the qualitative evaluation were those that had been working with POs and were engaged with the programme and happy to acknowledge increased awareness. In addition, they were eager to share learning with other students.

“They love it, it gives them ownership and they share with other students in peer to peer activity”.

Head of KS5 English, Strand C school 2016

“We might have progress! An assembly run by a male PE teacher about role models featured only male role models. Some girls came out complaining and they were vociferous –they wouldn’t have before”.

Head of Science and Assistant Head, Strand C school 2016

“It’s quite balanced in this school, there aren’t stereotypes but in some subjects there are more girls like Child Development and there aren’t many girls in Product Design”.

Group of 4 Y11 girls, Strand C school 2016

“Famous scientists are more likely to be men because of gender imbalance then”.

Group of 4 Y11 girls, Strand C school 2016

“In my middle school we called them [teachers] Sir and Ma’am – Miss is like lower down”.

Y10 girl, Strand C school 2016

“We’ve all heard friends and family say Engineering is a boy’s job”.

Group of 3 Y10 girls, Strand C school 2016

“In Tesco the Physics kit is in the boys’ aisle”.

Y10 girl, Strand C school 2016

“The boys’ PE department is better. We are inside more. We like to play football outside but we get benchball and are cooped up”.

Y10 girl, Strand C school 2016

“PE is still gender biased like there’s netball and football”.

Girl in Equality Leadership Group, Strand C school 2016

“There has been an increase in discourse. Girls are actively talking about engineering careers and this is not always through prompted conversations”.

Head of KS5 English, Gifted Lead Strand C school 2016

“Impact? More people are aware that it’s [gender imbalance/stereotyping] an issue”.

Girl in Equality Leadership Group, Strand C school 2016

“There are more female students taking Biology, Chemistry and Tech – they are more open-minded”.

Girl in Equality Leadership Group, Strand C school 2016

“Teachers are equal to us, but boys need to act differently in the lower years they still say ‘girls’ subject”.

Girl in Equality Leadership Group, Strand C school 2016

“When we had unisex toilets it upset the parents and then one side is painted red and the other blue. In Young Enterprise we can’t use red and blue like that”.

Girl in Equality Leadership Group, Strand C school 2016

“I have started noticing this feminism stuff”.

Y12 girl, Strand C school 2016

5.2.3 Impact on School Culture, Teachers and Teaching

Consultees in Strand C responded as positively as those in Strand B about the impact of the programme upon their views, and upon their teaching method and content. As an English teacher explained, her conduct in teaching has changed as she now targets boys and girls in various contexts such as asking a boy about a woman’s representation and not always a girl. The changes to teaching and to visual imagery around schools have been successful according to those who have encountered the programme. Achieving an impact on whole school culture compared with discrete departments or groups in the school is, as expected, harder.

The word ‘drip-feed’ was used by a wide range of Strand C consultees indicating they thought the whole school intervention should be applied.

“There has been an increase in discourse [about gender stereotypes] and it has been on the agenda more. We have also looked at our materials – the PO encouraged us to do it. The displays are good. We do try: We have Great Scientist posters and there are more females...and posters of staff who read – e.g. Mr X is reading ...”.

Head of Science and Assistant Head, Strand C school 2016

“Staff are trying to increase the careers input – the careers you can do with languages...”.

Head of Science and Assistant Head, Strand C school 2016

“It has had an influence on culture – It’s a forward thinking school even though it’s traditional. And we have tweaked practice – tweaking is what all schools do”.

Assistant Head and Lifeskills Lead, Strand C school 2016

“What’s been good about Strand C is there is lots of data analysis and we look at other subjects, for example boys not doing Psychology”.

Head of Science and Assistant Head, Strand C school 2016

“It’s had a profound impact on the way I construct lessons with careful use of pronouns. There is a natural inclination to go to ‘he’ and I’m conscious of the images I use”.

Head of KS5 English, Gifted Lead Strand C school 2016

“I have noticed a change in the way I am teaching, I might have more of a male brain and I have changed gender stereotypes for example in forces most images are male. I hadn’t noticed before – that’s a shame, so now instead of cars I am using gymnasts”.

Head of Physics, Strand C school 2016

*“It’s really worked for us. I didn’t expect a toolkit, I thought we would have the answers within. It’s a more subtle approach. Looking at the PISA data was enlightening, tracking back and looking – it’s all in the data. Girls are doing well in Physics – they get As but they are doing even better at English with A*s”.*

Assistant Head, Strand C school 2016

“X [PO] is really helping the school raise awareness. She is making us think”.

Employability Lead, Strand C school 2016

“The girls did a project on self-perception. They asked us about the way we view ourselves. I struggled on providing a physical attribute I liked, and it made me think about self-worth and made me ask myself ‘Am I practising what I preach?’”.

Head of KS5 English, Strand C school 2016

“I think that because the programme is being run at school, the awareness of gender based issues has increased. As a result, I have found myself thinking more carefully about the message that I give to my students”.

Verbatim comment teacher questionnaire, Strand C school 2016

“Since we circulated the gender neutral language leaflet around school, I’ve seen more efforts being made by colleagues to challenge gendered language. Staff are working hard to ensure that they, and their pupils, avoid phrases such as ‘man up’ that are so common in wider society”.

PSHE/Careers Lead, Strand C school 2015

“In day to day practice you get stuck”.

Head of KS5 English, Gifted Lead Strand C school 2016

“One of the first things the PO did after analysing pupil data was to observe lessons. It was noticed that boys tended to dominate classroom discussions and answering questions. Some teachers have started using techniques to address this such as no hands up, alternating genders or random name generators.”

Lead Teacher, Strand C school 2015

“The data has shown an achievement gap - overall girls are still higher so we’ve been meeting boys to make sure they feel actively listened to”.

Head of KS5 English, Gifted Lead Strand C school 2016

Strand C 'wins' have been seen when delivery has been led or supported by 'neutral' or non-departmental areas such as PSHE, Lifeskills and Careers work and also when leaders are able to push into more departments across school through CPD.

"Some of the interventions have gone into Citizenship and Lifeskills, we did a whole programme with Year 9 last year with positive feedback, and that's going into the Year 9 SoW next year".

Head of Science and Assistant Head, Strand C school 2016

"We have a CPD programme and it's a thing I now think more about these days: balance in teaching; and thinking about materials and neutral subjects. We are not perfect yet... There's more to go".

Assistant Head, Strand C school 2016

"I was already bothered about this issue before the programme and now I am much more aware of the stereotype threat and how we react and behave. It feels now as if we have more of a toolkit to use".

Head of Science and Assistant Head, Strand C school 2016

The physical manifestations of changes in school culture regarding gender stereotyping have been seen through displays and imagery throughout the school. The content is of course, important but also the visibility and the placement (with higher impact in non-departmental/neutral whole school areas). On the whole, Strand C schools had taken on this challenge well although not all have succeeded in promoting the messages beyond department noticeboards. A good practice example was seen during a tour of a Strand C school in which a display of scientists contained a very a high proportion of women scientists in a wide range of careers. The men shown were in non-stereotypical jobs. The display was put up by the Equalities student group, in an open area of the school (staircase) and ticked all the boxes: challenging gender stereotypes; promoting a wide range of careers; student-led; displayed in a whole school environment.

"I have spoken with the departments about challenging stereotypes so we have good posters and good balance and challenges to the stereotypes in our prospectus – so we have a girl and boy in Physics; a good balance in Computer Science; we have a lad in Textiles. Prior to the IGB we would not have thought about it".

Assistant Head, Strand C school 2016

"A little quote X [PO] sent out on [in email thought for the day] resonated with me. We are looking at gender bias in images, so in Drama showing boys performing as well as girls ...I am here to help. I am the man on the spot"

[Female] Web based Applications lead, Strand C school 2016

"The Health and Social Care lead is an example, having put positive images of men in health and social care where they are really needed as well as just challenging the stereotype".

Head of KS5 English, Gifted Lead Strand C school 2016

Some leaders are embracing the culture change and using it to drive all elements of the programme, reinforcing the importance of support at the top of the school.

"Where it is whole school it's about ensuring we have the correct climate. We have focused on boys in Art, we've looked at gender neutrality and new careers and IAG content".

Assistant Head, Strand C school 2016

“More staff are talking and aware of it [the programme and gender stereotypes] – sometimes it isn’t an issue - it’s just something they need to think about”.

Assistant Head, Strand C school 2016

“Students are largely unaware that IGB has begun in school. They might remember a display or assembly against gender stereotypes, but they probably won’t know it’s IGB or connect it to [the PO]”.

Physics Leader, Strand C school 2015

5.3 Fertile Ground and Barriers to Success

When asked whether they thought there were barriers to the potential success of the programme or its implementation, or whether they thought there are conditions in their school which constituted ‘fertile ground’ for the programme, leadership seemed to be the main driver according to Strand C teachers. This is a change from the interim phase in which teachers felt that lack of time and stimulus were the greatest threats. A whole school change is felt to be a huge undertaking that needs support and drive from a number of interested staff from the highest levels, ideally with time resource available for planning and co-ordination within the teaching body, especially when the IGB programme cycle ends along with PO support. Furthermore, it has become apparent that Strand C, requiring as it does strong whole school leadership, is the Strand whose success is most threatened by external pressures on the Leadership Team, e.g. Ofsted inspections.

Barriers

The following list summarises the barriers to successful implementation of Strand C:

- Lack of supportive leadership
- Stereotypical assumptions in the media and home
- Red tape within the school causing delay and some cases missed opportunities for external speakers/trainers
- School performance issues and external pressures e.g. Ofsted inspections
- Schools with a focus on non-science subject areas as a result of existing/previous Specialist statuses, or religious affiliations requiring curriculum time
- Non engaged staff who either believe intervention is unnecessary or who believe that boys require more help than girls
- Potential lack of leadership/co-ordination beyond the funded programme.

It is in Strand C in particular, with its focus on tackling gender stereotypes and trying to effect change on school culture, that the strength of societal stereotyping running through families and other social structures is seen. The schools are part of that social structure and so are trying to promote change from a place of embeddedness within social norms.

“The reason I was happy to be Strand C is because this is a social problem that’s getting bigger....I have [N children] who went to a girl’s party and we were looking at something to buy, and there was a pink aisle!”.

Head of Science and Assistant Head, Strand C school 2016

The evaluator questioned teachers in schools about the nomenclature of teachers when names are not used by pupils. The use of ‘Sir’ and ‘Miss’ is still the norm in many schools in the country. In schools in Strand C it was notable that this practice only seemed to be challenged in one school, which operates in an area in which middle schools use the more balanced ‘Sir’ and ‘Ma’am’ terminology. The Lead Teacher in that school is trying to change the practice to continue the more gender equal terminology through to the secondary school. There also seemed to be no discussion or challenging of this, nor other more widespread

gender unbalanced norms such as women changing their surnames upon marriage and the use of Mrs/Miss.

A whole school approach requires all staff across the range of departments to engage and reinforce each others' work. The evaluation found that there are pockets of resistance to the idea that any gender imbalance or lack of neutrality exists which forms a barrier to engagement and reinforcement.

Strand C, being such a wide reaching Strand and having a similar timescale in which to achieve its goals as the other strands (albeit with more resource), may be hampered by having to push culture change in departments that may not be as responsive or as ready within the timescale. Within Strand B, for example, there were no instances of Heads of Department feeling threatened by some of the interventions.

"It depends on personalities. A lot of staff said there isn't a problem and some were threatened by unconscious bias...".

Head of Science and Assistant Head, Strand C school 2016

"There is a small cohort of staff that when something new is introduced think it is too much change and they say that there are too many initiatives having an impact on their workloads. But once they started to see what it was, they gained confidence, and when people saw the impacts...it was better".

Head of KS5 English, Gifted Lead Strand C school 2016

As stated above leadership is a crucial factor for the success of the programme. In schools which are squeezed due to Ofsted or other pressures, more long-term goals may get side-lined in favour of more immediate priorities. One Head in particular has been seen as running a 'very tight ship', with all decisions going through their office, thereby causing delays and missed opportunities for the project. This, however, was also in the context of Ofsted pressures. This shows the impact of external pressures on Strand C implementation in particular, relying as it does on such strong 'whole school' leadership.

"Our Head would have been happier had it been Strand A...".

Head of Science and Assistant Head, Strand C school 2016

"It's been quite frustrating at times. If we could have had a freer rein we would have achieved more".

Head of Science and Assistant Head, Strand C school 2016

I think it is an excellent programme but it does need full support from the whole of the SMT in order for it to be fully effective. It was hard for us to do this without full backing. We had to battle to get some initiatives through".

Verbatim comment teacher questionnaire, Strand C school 2016

"With hindsight I would sign up for the programme again. It's not worked so well as it could have because of us not the programme".

Head of Science and Assistant Head, Strand C school 2016

"Naturally you expect barriers – for example the attitudes of staff, some had some views. Therefore it was appropriate and it helped get more staff on board to include boys and then it's not 'feminist' but about equality – so Great Men did win over attitudes".

Assistant Head, Strand C school 2016

Indeed, these concerns regarding bias towards girls and schools failing to address the needs of boys have been apparent during the programme and persist.

“The overall education system itself is in favour of female students. Due to the content, primary schools influence, and overall delivery. Therefore, it seems unfair to actually attempt to re-address the few areas where males actually excel”.

Verbatim comment teacher questionnaire, Strand C school 2016

“The programme title is mis-leading ... stop ‘gender’ being code for women. Work for equality for all. Boys face exclusion from some subject areas, they are also under-performing in exams. Gender imbalance against boys is harder to address”.

Teacher, Strand C school 2015

As in Strands A and B, there were concerns about the length of the programme, and in the particular case of Strand C, concerns about its breadth. As stated above (see Outcomes) some Strand C Lead Teachers felt that the programme was just beginning to see traction. The breadth of the programme has also required some schools to define the limits of the programme.

“It’s been two years and it’s just getting going – we are just scratching the surface!”.

Head of Science and Assistant Head, Strand C school 2016

“We decided it was too much to work with parents and we wouldn’t put it in the remit. We might work with our primary schools, we are just trying to work that into our plans and that is the area we would work at”.

Assistant Head, Strand C school 2016

It’s so deep rooted and there is so much unconscious bias, we are bombarded with it daily. This will be hard to counteract and will take time. We have started some important work”.

Verbatim comment teacher questionnaire, Strand C school 2016

“I would love this to be a longitudinal project. ...At the rate it’s moving now, If the messages keep on going the impacts will be huge”.

Head of KS5 English, Gifted Lead Strand C school 2016

“There was some confusion about the programme because it contained the word gender and they got involved thinking it included LGBT. That’s fine but I don’t like to muddy the water. It is difficult to keep focus. A working group of students went into Islamophobia....There is a reason you have to manage things. We can only deal with one prejudice at a time but I have seen them argue about issues of general equality which is really nice”.

Assistant Head, Strand C school 2016

While the programme is ‘whole school’, discrete pockets of engagement and areas showing more success than others are apparent.

“I had to change a couple of PowerPoint presentations; one of which showed all male footballers and another showed an advert of a man driving with a woman sitting next to him with a sexist joke and her mouth taped”.

Head of Science and Assistant Head, Strand C school 2016

“The Science Department is totally engaged but I don’t know about other departments; a form has been sent across the school about it”.

Head of Employability, Strand C school 2016

Similar to comments raised by participants in Strands A and B, concerns about the age at which opinions are formed and set have been raised. Within the whole school approach, younger pupils are necessarily included, however teachers talked about feeder schools and the attitudes and learning acquired in those institutions.

“One of the main feeder schools has a bad science department – Years 6 and 7 are crucial – It’s when they form their ideas so we should definitely work with them at [lower age] – when they come in they say ‘I’m no good at science!’ or ‘I can’t do Physics’”.

Head of Science and Assistant Head, Strand C school 2016

When older girls are approached about subject choice the influences that have shaped their views are not always apparent to them.

“I have noticed that girls are often quite antagonistic when faced with gender balance issues. When talking about subject choices – for example when filling in IGB questionnaires - some students seemed to feel that they were being treated as if they couldn’t make their own decisions based on what they actually wanted to do”.

Verbatim comment teacher questionnaire, Strand C school 2016

In the interim programme, POs found that it is difficult to arrange for time to meet with groups of teachers, and that whole department/ whole training/ awareness sessions are very hard, if not impossible, to arrange. Work-around solutions have been sought, such as production and distribution of booklets, and increased one-to-one/one-to-pair contact, but this is generally limited to teachers who want to engage with the programme and the PO. Time constraints still remain. Strand C Teachers and Leads commonly want additional time as they can see the potential and reach of the programme. However, timetables and their own limited capacity force ‘rationing’ of what they can do (in addition to all the work from POs). This has implications for sustainability.

Workaround measures used successfully by POs include all staff ‘thought for the day’ emails distributed on a weekly or fortnightly basis to reinforce messages, and continuing to drip-feed through new ideas and concepts.

Fertile Ground

Various elements within the engaged schools provided fertile ground for the programme’s messages and interventions to spread. These supportive features were identified by Lead Teachers and teachers engaged with the programme:

- Lead Teachers who had allies/friends who would support them in other departments or in whole school delivery
- Strong support from the top, preferably the Head or SLT support, to address gender imbalance and explore new ways of working
- Working through whole school mechanisms such as IAG, PSHE and assemblies
- Support for implementing new schemes of work, PSHE lessons, parent information sessions etc.
- Explicit working with boys as well as girls on areas of low take-up and underachievement
- Selling the programme through ‘early impacts’ and resources
- Clarity of expectation that staff will embrace the approach and concept not only with the aim of increasing female take up of Physics A level but for rebalancing gender take-up and achievement in other subject areas including those with few male participants

- A core body of staff/departments that are open to experimentation and continual improvement, without feeling that their current/previous practices are being undermined or criticised: an attitude of ‘we can always find ways to do things better and provide more inspiration for the future of our students’, even by small degrees
- Active and engaged PSHE/IAG staff who will embed gender neutrality within PSHE and increase the range and gender neutrality of career options presented to pupils
- Working from Year 7 upwards.

“If staff in this school are not aware of IGB, it’s their own fault, there’s lots of information pushed out to them, but some will just not be interested”.

Teacher, Strand C school 2015

“X [interim Head] has been fantastic. He put the student leadership structure though, and he has been a driving force. When things come out, X pushes it including growth mindsets”.

Head of Science and Assistant Head, Strand C school 2016

5.4 Sustainability

It has become clear throughout the programme that schools need an enthusiastic and well supported co-ordinator or champion, preferably backed up by a ‘whole school’ working group, in order to maintain momentum. This is even more the case when schools are facing the end of programme interventions and ‘drip-feed’ which have been initiated and heavily supported by the PO. As stated above, two Strand C schools are facing changes in leadership: one with a new head; and one with a changed leadership team and IGB Leads and supporters on the SLT unfortunately being made redundant. In the two remaining schools, there is clear support from leaders identifying areas in which they can sustain and embed the programme.

“Legacy? Well it’s embedded really well. It will continue. It’s permanent. For example I can honestly say that I will look at data and say ‘why isn’t it the same for males and females?’ And find out, then alter things if we need to”.

Assistant Head Strand C school 2016

“I am meeting with a colleague so we can put changes into the College Improvement Plan. We do need to be careful we don’t overburden....I think we’ve gone slow and steady and implemented things that will last so it can be done and embedded”.

Assistant Head, Strand C school 2016

“I feel now that we are at a stage where it can be embedded but the concern is that the long-term success might be jeopardised with a change in leadership”.

Head of KS5 English, Gifted Lead Strand C school 2016

In Section 4, Strand B (above) it was noted that teachers responded well to the support and guidance offered by an external expert providing that ‘external eye’ to renew, improve and reinvigorate practice. For some teachers it has been the key to their buy-in to the programme. At the end of the programme, it will be essential for some form of partnering (with another school) or internal mentoring system to be put in place to retain that external feedback and support. Whether it will be as successful to buddy with colleagues or with ‘rivals’ from other schools is unknown.

“It works because we’ve got a PO coming in to school twice a week to talk to and guide us. Someone to work with”.

Teacher Strand C school 2015

While it has proven difficult to arrange for time to speak to meetings of all teachers due to pressure on agendas for whole-staff meetings and lack of opportunity to convene additional gatherings, POs and Lead Teachers are clear that it is important to engage with as many teachers across the school as possible in order to create a better legacy for the programme.

Even though Strand C schools have not wanted to make pupils too aware of the IGB programme in their school, some of the work that has been done with pupils is felt to have potential for sustaining impact. By embedding new lesson plans within PSHE for subsequent years, it will be possible to ensure that gender bias and gender neutral language is discussed with pupils at early stages of their secondary school careers. One school also discussed its approach to empowering pupils to monitor the gender neutrality of teachers by pointing out any times where they feel a teacher makes or repeats a gender stereotype or assumption.

“Pupils have the best ideas on what we should do. They are the most perceptive”.

Teacher, Strand C school 2015

5.5 Suggestions from Participants on Raising Uptake

Teachers and students were asked whether they had any ideas for increasing the number of girls taking A level Physics. Many comments related to starting interventions with younger pupils. Of interest, one teacher picked up on a contradiction noted by the evaluators in both Strands B and C – using ‘female’ examples to illustrate Physics concepts might reinforce stereotypes.

“Starting earlier and going into primary schools – This is an upper school so by Year 9 they are already set in how they think”.

Head of Science and Assistant Head, Strand C school 2016

“In lower school there isn’t any science and at middle school it’s all biology”.

Y10 girl, Strand C school 2016

“We do need to go back to Primary. Who is doing the reading there? Who is being encouraged to do the technical stuff? Look at online gaming. I do a lot of work on digital equality – this is where you need to engage primary schools and parents”.

Assistant Head, Strand C school 2016

“Not making ‘Science for Girls’ to be about hair products or make-up. We need to tackle the stereotypes, not reinforce them!”.

Verbatim comment teacher questionnaire, Strand C school 2016

Pupils discussing gender inequalities largely in PE reflected on teachers in general. Throughout the programme, girls were always keen to say that most teachers were fair and treated boys and girls equally. However, they are unaware of the effect of different styles of questioning and organising classrooms. It was somewhat surprising, therefore, that the following comment was made:

“Educate the teachers, they are influencing us from Year 7”.

Girl in Equalities Leadership Group, Strand C school 2016

Summary and Learning Points: Strand C

- Strand C is delivered through a 'whole school' approach. Positive impacts as a result of the IGB programme have been evident in all schools.
- There are reported increases in uptake of, and interest in, A level Physics by girls.
- Positive impacts against the specific objectives of Strand C have also been noted: teachers' awareness of gender stereotypes; increased awareness by some pupils of gender stereotyping; increased awareness of non gender-stereotypical careers, and evidence of whole school impacts on culture through staff and pupil actions.
- Some Strand C leads and those closely involved have described the programme as 'transformational' in their own practice and in starting to turn around entrenched cultures in their schools.
- Strand C schools have paid particular attention to providing non-stereotypical imagery in school materials and in posters and displays around their schools.
- Teachers report changes in the style and content of their teaching, and more self-reflection on their teaching with regard to gender neutrality similar to impacts in Strand B
- Similar to Strands A and B, there are concerns that interventions delivered to older pupils will not have an impact on girls' uptake of Physics at A level and that work should be undertaken with younger pupils including those in feeder schools.
- Outcomes reported as attributable to the programme include an increased awareness and use of gender neutral language amongst staff and pupils, and an increase in careers input in lessons. Awareness of gender non-stereotypical careers may have increased but this has not yet widened into an increase in awareness by girls of a range of careers available to them as a result of studying Physics.
- In this whole school approach, there are pockets in schools where change is less evident and there are still staff who have not yet bought into the aims of the programme. Particular attention might be given to PE departments where it seems gender stereotyping, inequality of opportunity, and worse has been reported by girls in all three strands.
- Similar to comments made in other strands, the power of using data to tackle gender inequalities and stereotypical option choice was raised by teachers.
- The key barriers to the successful implementation of the Programme in Strand C include lack of commitment of all staff to engage and reinforce the programme across all departments; and issues with the dependence on strong leadership required to drive and maintain a whole school approach.
- Time remains a barrier: Strand C teachers commonly want additional time to devote to the programme. Timetables and their own limited capacity force 'rationing' of interventions. Hence, once the POs withdraw, sustainability will be problematic if interventions are not embedded throughout school,
- Pre-requisites for success of the whole school approach include strong leadership from a powerful school leader or whole SLT support to address gender imbalance for boys and girls; and an open and trusting environment in which to experiment and to work towards continual improvement. Higher buy-in of staff has been seen when the programme has used the banner of 'gender equality' and when seen to be undertaking interventions to address issues for boys as well as girls.

- The programme seems to work better when there are multiple members of staff who work across the whole school involved in driving the programme forward. These members of staff include, for example, PSHE leads, Heads of 6th Form, and Heads of Teaching and Learning.
- Concerns were expressed about the timescale (too short) of the intervention to achieve such a breadth and depth of change. Some schools deliberately focused the scope (e.g. not working with parents) as part of their change management process.
- Strand C concerns itself with school culture and stereotypical assumptions. Within the process deep-rooted societal imbalances in nomenclature may have been overlooked by practitioners.
- One Strand C school in particular is already motivated and geared up to embed the programme. Concerns about leadership change have been raised by two schools.
- Teachers have commented on the usefulness of having an external eye on their practice to avoid 'staying in a rut'. The question remains that unless schools partner with an external agent – e.g. partner school, will further challenges and a fresh perspective on practice be available?