Ondata Research

Physics Mentoring Project
Final Evaluation Report

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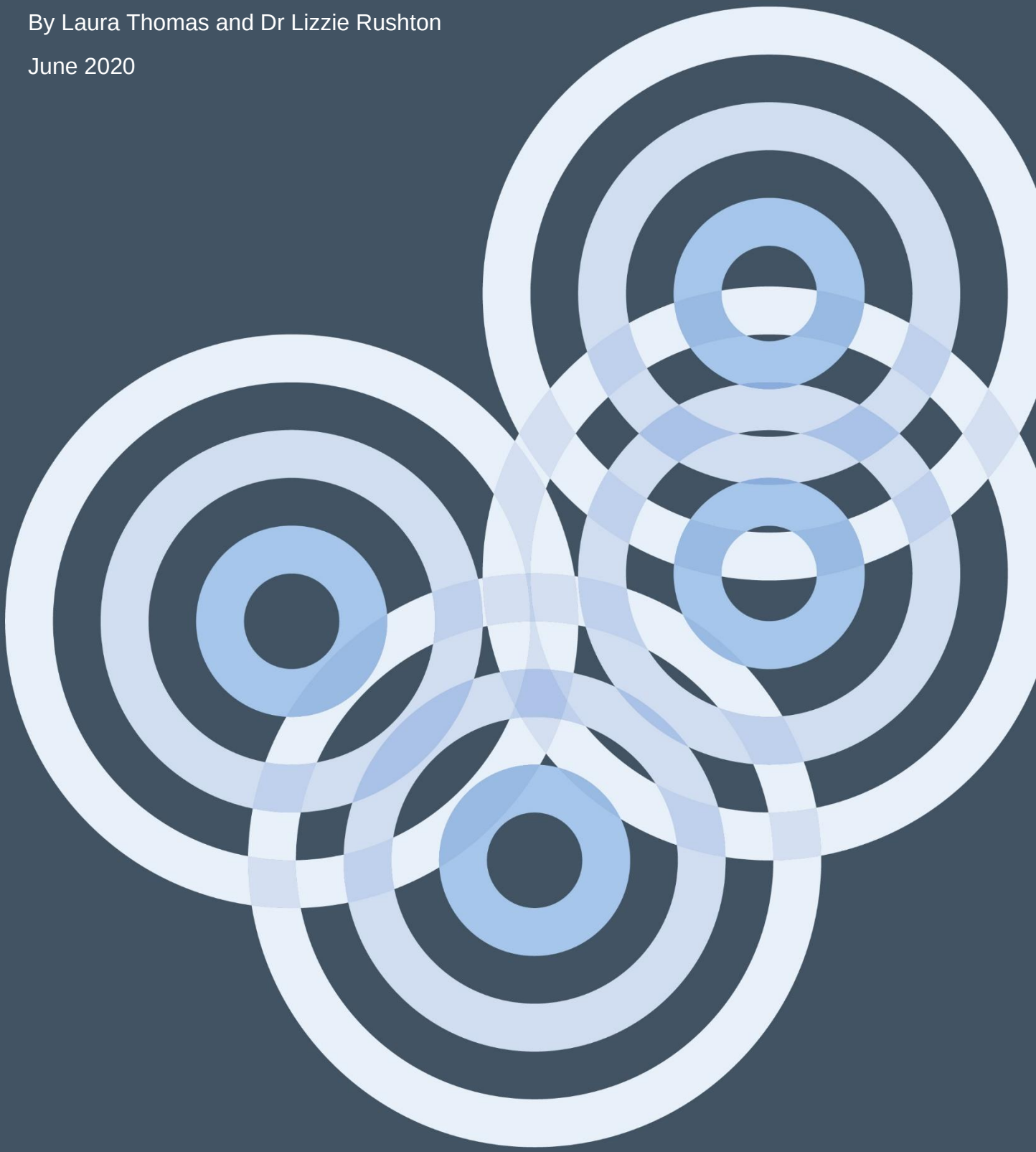
June 2020



Contents

Executive Summary

This report is the final in a series of three that has examined the impact of the Physics Mentoring Project (PMP) led by Cardiff University between January 2019 and March 2020. The focus in this report has been on reviewing the project's key aims of increasing the uptake of physics and positively impacting female pupils' intentions towards a science-related career. Summary findings are presented from three cycles of mentoring and the impact on pupils, mentors and schools is discussed.

Key findings from cycle 1

- In cycle 1 (January to June 2019) the Physics Mentoring Project (PMP) worked with around 90 year 10 and 11 pupils from 9 schools in Wales.
- There was a 12% increase in the proportion of mentees indicating they "definitely" or "probably" will take a physics A-level: 16% pre-participation increasing to 28% post-participation. This compared with no change in intentions being recorded amongst non-participating pupils in the same schools.
- A large increase in the proportion of female mentees indicating an interest in a science-related career ("definitely" or "probably" will): 29% pre-participation compared with 48% post-participation. Amongst female pupils who did not participate there was a drop of 8% in those interested in a science-related career during the same time period.

Please note that the findings reported here around Physics uptake and science-related career intentions are higher than those reported in the first interim report (Rushton & Thomas, 2019) due to additional survey returns being received following publication and the data from these surveys being included in an update analysis of impact.

Key findings from cycles 2 and 3

- Cycles 2 and 3 were undertaken in the 2019-2020 school year. In cycle 2 the PMP worked with 14 schools and in cycle 3 this was 7 schools (each of these 7 continued from cycle 2 into cycle 3).
- Following participation in cycles 2 and 3 of mentoring, there was an increase of 38% in the proportion of mentees reporting that they now intended to "definitely" or "probably" take Physics at A-level: 5% pre-participation increasing to 43% post-participation.
- This is a significant increase in terms of impact compared to cycle 1. This could be attributed to various factors, including the improvements made to the training of mentors, the introduction of a robust underlying theoretical approach (Godec et al., 2017) or the improved targeting of participating pupils.
- There is additional impact on stakeholders:

- Evidence from cycles 2 and 3 clearly shows the benefits of participation in the programme for the university mentors. In particular this relates to skills development and the opportunity to experience a school environment in a professional capacity. The latter has the potential to contribute to the recruitment of physics teachers, of which there are persistent challenges in Wales and across the UK in relation to recruitment and retention (House of Commons Library, 2018).
- With regards to the impact in schools, teachers reported that participation in the project improved their links with universities, provided connections between physics and the real world and brought their pupils into contact with role models.

Conclusion

The Physics Mentoring Project model has shown the success of working with teachers to identify pupils who are unsure about whether or not to continue with their physics studies and provide them with ongoing and personalised sessions.

Those who are selected to participate in the mentoring project experience tailored sessions in small groups led by trained physics undergraduates who work to build rapport and act as role models in physics.

In order for this approach to be successful it requires a significant amount of time invested in building robust relationships between universities and schools, achieved through using a central co-ordinator working on behalf of partner universities.

Schools themselves make an ongoing commitment to provide the time of a (physics) teacher to select pupils, make arrangements with the mentor and make logistical arrangements in terms of providing a space for the sessions and co-ordinating the availability of the mentees themselves.

It is recognised that teachers' time is highly sought after in schools, however if the aim of the school is to increase uptake of physics then the investment required for participation in a project such as this should be considered one that will bring rewards.

The mentors recruited from the partner universities are also committing a significant amount of time to the project, in particular through attendance at a training weekend, time spent preparing sessions along with travel time to the schools to lead the sessions. They not only receive a small bursary but have the opportunity to enhance their own employability, develop new skills and experience working in a school.

Whilst the stated aims of the project focus on the impact on the project on pupils, it is clear that there are many different stakeholders that receive a benefit from participating.

Introduction

The Physics Mentoring Project (PMP) is co-ordinated by Cardiff University and is a partnership of universities from across Wales (in addition to Cardiff the universities are Aberystwyth, Bangor, Swansea and University of South Wales).

Schools participating in the project come from a range of urban and rural settings. Mentors are recruited from the partner universities and take part in a centrally organised training session before going on to lead sessions in schools. Mentors typically spend five weeks visiting schools to run weekly sessions on physics-related content. At the conclusion of the programme mentors are paid a bursary.

The main aims of the evaluation are to:

1. To explore the impact of the programme on the uptake of Physics.
2. To explore the impact of the programme on the uptake of women in STEM subjects.

Between cycle 1 and cycles 2 and 3 the theory underpinning the project was developed to incorporate Science Capital. Introduced by Louise Archer and colleagues (Archer et al., 2015a; DeWitt & Archer, 2017), Science Capital has been developed to help understand differing participation levels in science and in particular addresses issues around how learning can be more equitable. With this aim in mind, the Science Capital Teaching Approach (Godec et al., 2017) challenges the existing approaches in education which perhaps favour those from certain social groups (Archer et al., 2015b).

In the case of the PMP, the Science Capital Teaching Approach has been used to underpin the approach of the mentors. In particular, this has meant that the mentors are encouraged to personalise and localise the sessions and make them more relevant to the mentees.

This is the final report for the project and covers three cycles of mentoring between 2019-2020. Two interim reports – Rushton & Thomas (2019) and Rushton & Thomas (2020) – have previously been published focussing on cycle 1 and cycle 2 respectively.

Impact of COVID-19 on project:

Unfortunately, due to restrictions implemented in schools in March 2020, 6 of the 7 schools did not complete all of the scheduled sessions. School closures also meant a reduced response rate to the post-participation surveys. Whilst 12 schools submitted responses to the survey there was a small number submitted per school. However, sufficient data was available from schools participating in cycle 3 to enable robust analysis of data provided which included responses to surveys, mentor reflection sheets and interviews with the project team.

Methodology

An overview of the evaluation methodology is provided in this section. The full timeline can be found in the Appendix. A Mixed Methods approach has been taken throughout, combining both quantitative and qualitative methods. Whereas the quantitative data provided by surveys can help us to describe impact around physics uptake, qualitative methods are needed to help make sense of the social world and to describe more fully the experiences of the different stakeholders (Cohen et al., 2018).

The following table summarises the data collected over the lifetime of the project:

	Cycle 1	Cycle 2	Cycle 3
Pupils/Mentees:			
Pre-participation survey	Y	Y	Y
Post-participation survey	Y	Y	Y
Mentee reflection sheets	Y	Y	Y
Mentors:			
Training evaluation	Y	Y	N/A
Training observations	Y	Y	N/A
Mentor reflection sheets	Y	Y	Y
Teachers:			
Teacher interviews	N	Y	N
Post-participation survey	N	Y	Y
Other:			
Stakeholder interviews	Y	N	N
Project team interviews	Y	Y	Y

Table 1. Summary of data collected across the three cycles of mentoring, 2018-2020.

The focus of this report is on a detailed analysis of the responses to the pupil surveys across the three cycles along with the latest set of mentor and mentee reflection sheets, a teacher post-participation survey and interview with the Project Co-ordinator. The remaining items have been included in the two previous interim reports (Rushton & Thomas, 2019; Rushton & Thomas, 2020).

Pupil surveys:

- The same surveys were consistently used across all cycles before and after mentoring ran. The surveys were made available to schools online and in paper format.
- The pre-participation survey was given to the whole year group of the participating school. This allowed a baseline set of attitudes to be recorded and also played a role in the selection of potential participants for the PMP. Teachers were given a list of the pupils who responded “I am unsure” in response to whether they were considering

taking Physics at A-level. The teacher then made the final selection for the mentoring programme, based on the students' ability to undertake Physics A level.

- The post-participation survey ran on completion of the mentoring programme. Although due to the school closures relating to the COVID-19 outbreak, 6 of the 7 schools did not complete the full set of mentoring sessions and therefore not all were able to complete this survey (6 schools were one session short of completion). The purpose of this survey is to be able to monitor whether there have been any changes in intentions following the intervention. As with the pre-participation survey it is given to a broad cohort within the school. Including those pupils from the same schools and year groups who did not participate in the project allowed a measure of natural control. This meant that any changes observed in mentees can more likely be attributed to their experience of the PMP rather than more broadly related to their experience of physics in the school setting.

Mentor and mentee reflections:

- Weekly feedback forms were completed by mentors and mentees.
- Mentors' feedback focussed on how the session ran and what can be improved for the following week.
- Mentees were asked to think about the content of the session and describe their thoughts around it.

Teacher survey:

- A survey was circulated to teachers in schools taking part in cycles 2 and 3. This focussed on the impact they observed in school amongst their pupils, the impressions they had of the mentors and support provided to them by the PMP project team.

Project team interview:

- Once cycles 2 and 3 had been completed a phone interview was conducted with the Project Co-ordinator. This focussed on reflecting on the key aims of the project and the organisational and logistical arrangements around recruiting mentors and working with schools.

This mixture of qualitative and quantitative methods has been used as a basis for the findings presented in this report.

GCSE uptake and science career intentions

Results from Cycles 2 and 3

Initial results from cycle 2 were presented in the second interim report (Rushton &Thomas, 2020). Since publication, a further set of mentoring took place (cycle 3) and the impact of participation across cycles 2 and 3 are now examined here.

At the beginning of each cycle, pupils completed a pre-participation survey. Following the conclusion of the mentoring sessions a post-participation survey was circulated to schools for mentees and non-participating pupils to complete. By asking non-participating pupils to respond to this second survey, this provided a natural measure of control against which the impact on mentees can be put into context. This is an important comparison as the non-participating pupils were taught in the same school environment and by the same teachers, therefore this limits the possibility of the effect seen in mentees being due to non-mentoring factors.

Pre-participation survey responses

A summary of the cycle 2 and 3 pre-participation survey is presented here to provide context on attitudes towards STEM in school. The initial tables give an indication of gender and year group split of the respondents.

Gender	N	%
Female	1076	59%
Male	713	39%
Prefer not to say	49	3%
	1838	

Table 2. Respondents to pre-participation survey by gender.

Year group	N	%
Year 9	45	2%
Year 10	934	51%
Year 11	853	46%
Other	3	0%
	1835	

Table 3. Respondents to pre-participation survey by year group

Further information on the split of science courses being taken by respondents is available in table 4.

Triple science	43%
Double applied science	5%
Double award science	48%
Single applied science	3%
BTEC Science	0%

Table 4. Responses to pre-participation survey question “Which science course are you taking?”

- The respondents are fairly evenly split between Double award and Triple science, with only very small numbers taking Double applied and single applied science. It is worth noting that students who complete the Double award single course are less likely to continue with science subjects at A level.

The pre-participation survey provides information on the attitudes to physics and STEM in schools however, it also aids in the selection of pupils for participation in the Physics Mentoring project. In particular, those who responded, “I am unsure” to the question “How likely are you to choose Physics at A-level?” were considered for participation.

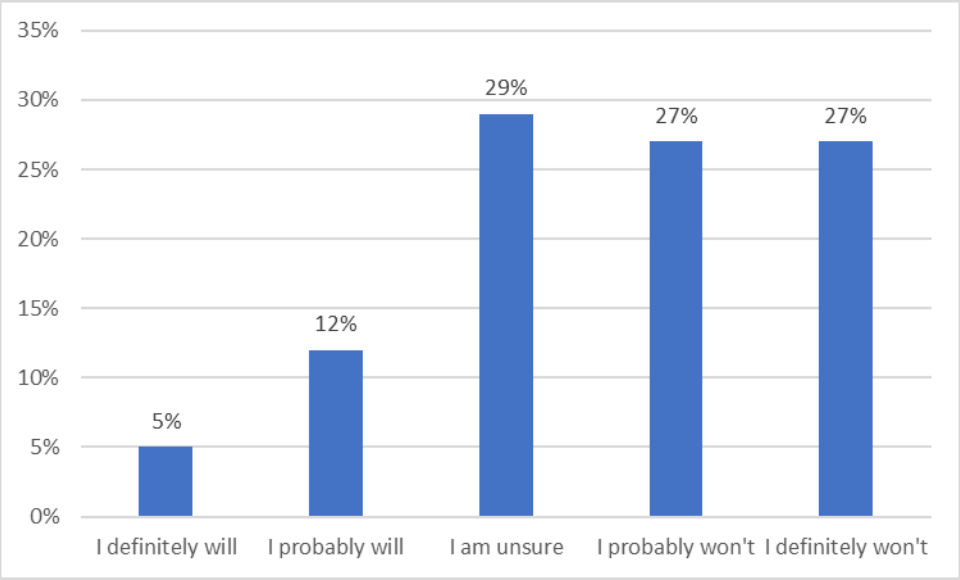


Figure 1. Responses to pre-participation survey question “How likely are you to choose Physics at A level?”

- In terms of positive attitudes towards Physics A-level, 17% of respondents said they “definitely” or “probably” would consider taking the qualification.

Another important area around attitudes to STEM is whether the respondents are considering a career involving science.

- In this case 36% say they “definitely will” or “probably will:

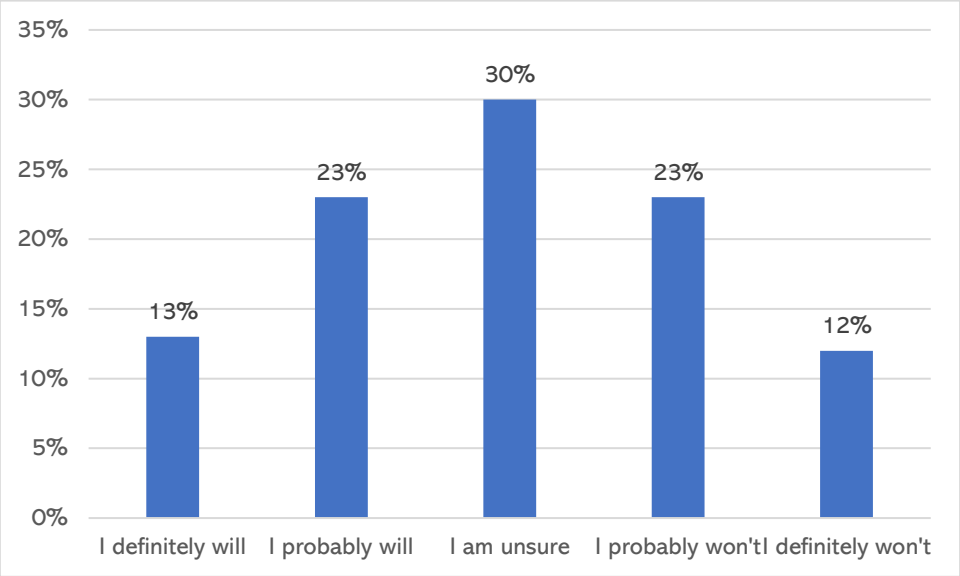


Figure 2. Responses to pre-participation survey question “How likely are you to choose a career that involves science?”

One further area of interest is participation in other STEM-related activities at school. However, only 3% reported that they were involved in any school-based science clubs or activities (e.g. CREST awards or STEM clubs).

Post-participation survey responses

The following tables show the differences between the responses to the post-participation survey from cycle 2 and 3 mentees compared with the non-participating students. A negative number indicates those who did not take part had a lower response rate than mentees.

In general, there was a difference between the two groups in terms of the types of science course being taken:

Science course	Mentees	Non-participating pupils
Triple science	69%	29%
Double applied science	0%	0%
Double award science	28%	69%
Single applied science	2%	1%
BTEC Science	0%	1%

Table 5. Reponses by cycle 2 and 3 mentees and non-participating pupils to post-participation survey question “Which science course are you taking?”

- As can be seen, there is a much larger proportion of mentees taking Triple Science whereas the non-participating pupils are more likely to be taking Double award science. This is unsurprising as pupils who intend to take science subjects at A-level are more likely to opt for the Triple Science GCSE route rather than the Double award. It is likely that the decision to take Triple or Double award Science is a combination of pupil preference and teacher guidance, however this varies across schools with some relying solely on teacher assessment of pupil’s suitability. The extent to which the prior decision regarding GCSE science route shaped pupil attitudes towards their own science futures is unclear at this stage.

One of the key aims of the project is to increase the numbers taking A-level Physics. It is clear that there has been a positive effect on the cycle 2 and 3 mentees.

- Of those participating in mentoring, 40% responded “I definitely will” or “I probably will” when asked about their intentions of taking a Physics A-level. This is an increase of 29%, compared to those who did not participate:

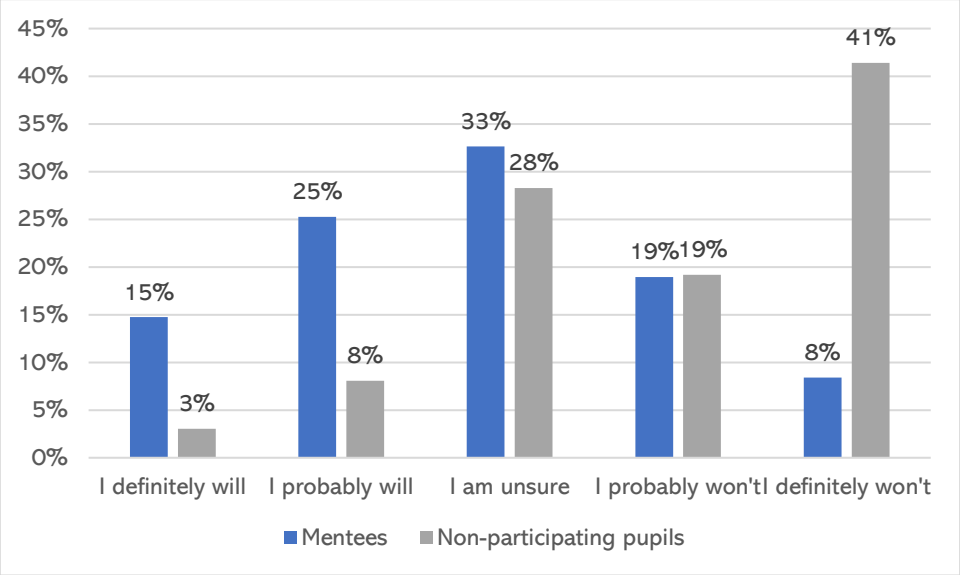


Figure 3. Reponses by cycle 2 and 3 mentees and non-participating pupils to post-participation survey question “How likely are you to choose Physics at A level?”

A second key aim relates to the intentions around science-related careers. Again, a more positive response is recorded by the mentees by the end of the Physics Mentoring project, with 60% of mentees reporting that they are likely to choose a science related career, compared to 38% of non-participating pupils

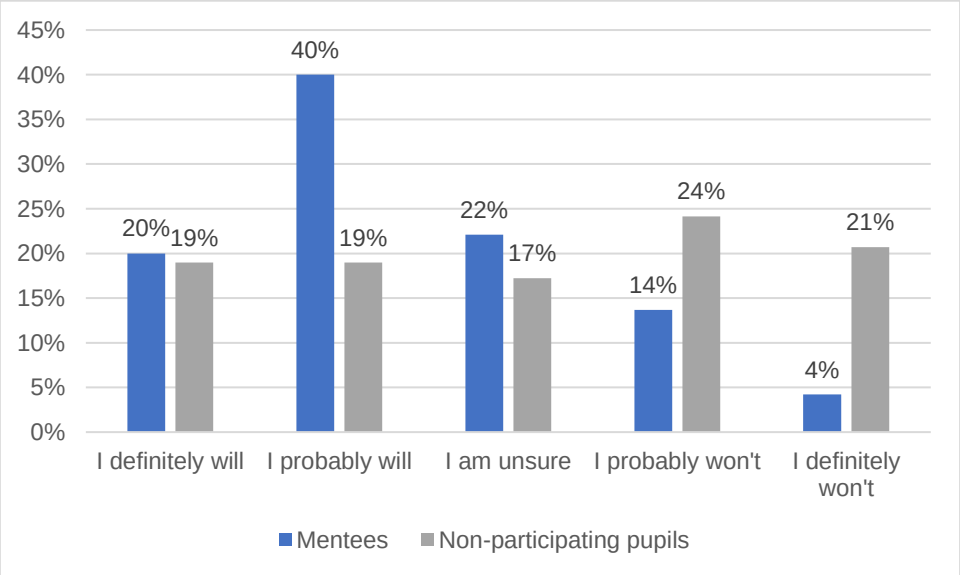


Figure 4. Reponses by cycle 2 and 3 mentees and non-participating pupils to post-participation survey question “How likely are you to choose a career that involves science?”

To provide further context for the impact on pupils, teachers were asked to complete an end of project survey following the completion of cycles 2 and 3. In general teachers reported a positive impact on their pupils. One or two felt the reaction was mixed, with the pupils who invested more in the sessions getting more out of them.

"They have all really enjoyed it and some have changed their views towards Physics."

Teacher

"Pupils have enjoyed the process and most found it useful in securing their thinking on whether or not to study physics further."

Teacher

Impact on Mentees in Cycles 2 and 3

This section focusses on the analysis of pre- and post-participation surveys from mentees. Responses were only considered if a mentee had both a pre- and post-participation survey response recorded (n=68, from 12 schools).

The impact on intentions towards Physics A-level are first considered:

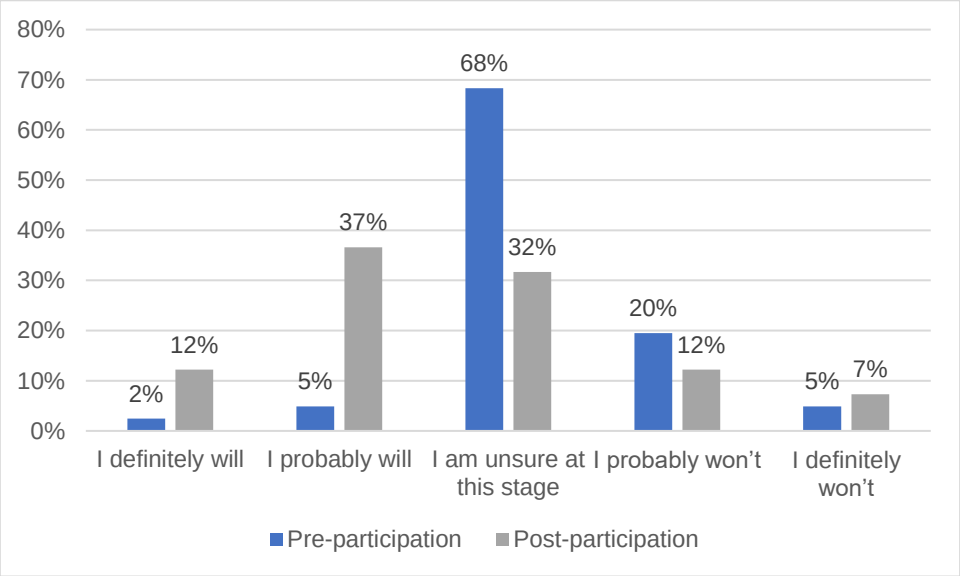


Figure 5. Comparison of responses to pre and post- participation surveys from mentees only in cycles 2 and 3 participation in response to the question "How likely are you to choose Physics at A level?".

- Very positive movement from unsure to "definitely" or "probably will" = 38% increase, with the results being statistically significant ($p<0.05$). The movement between pre- and post-participation is examined in more detail in figure 6 below.

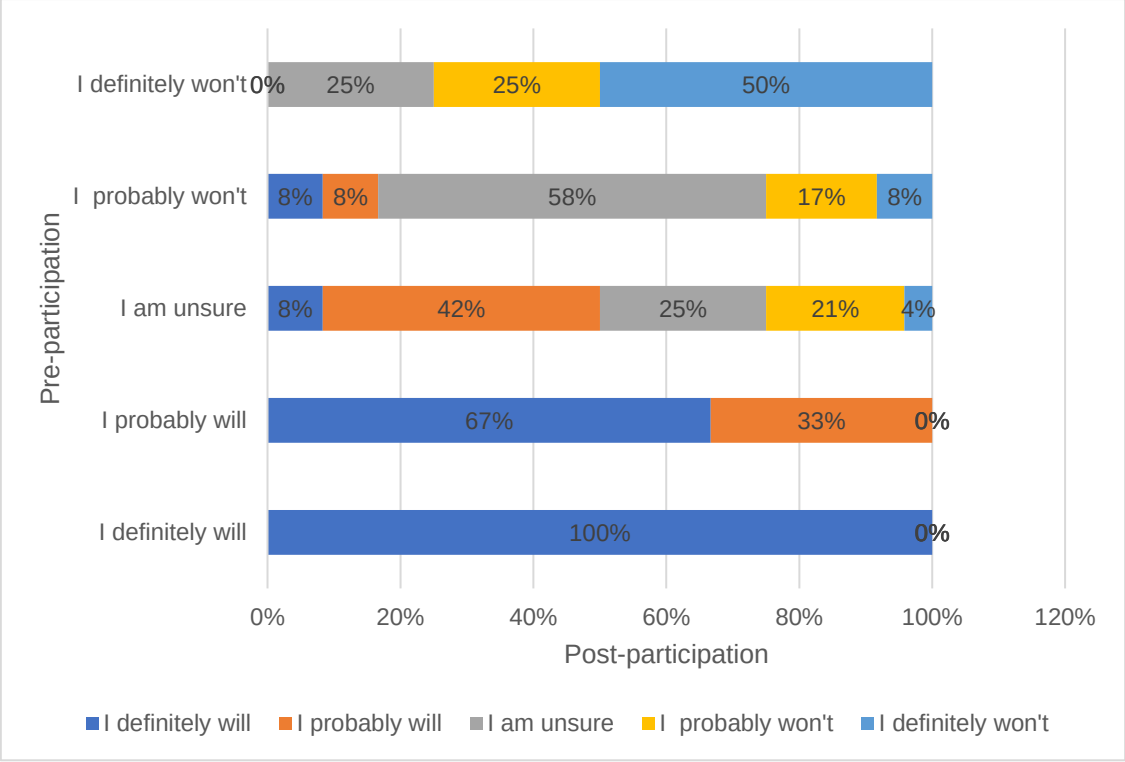


Figure 6. Movement between responses pre- and post-participation in response to the question “How likely are you to choose Physics at A level?”.

In figure 6, it can be seen that:

- For the key target group of “unsure” half move into “I definitely will” or “probably will”.
- For those who were initially identifying as “I definitely won’t” it can be seen that participation doesn’t sufficiently move them up through the categories. This suggests that the programme is well targeted to those who are “unsure”.
- For those who were initially in the “probably will” category they either remain where they were or move more positively towards taking Physics at A-level.

In summary, for those who start off with positive attitudes, these are not adversely affected and those with more negative attitudes find themselves becoming more disposed to a physics A-level.

When we turn to consider intentions towards a STEM career, again it is seen that there is a general shift away from being unsure:

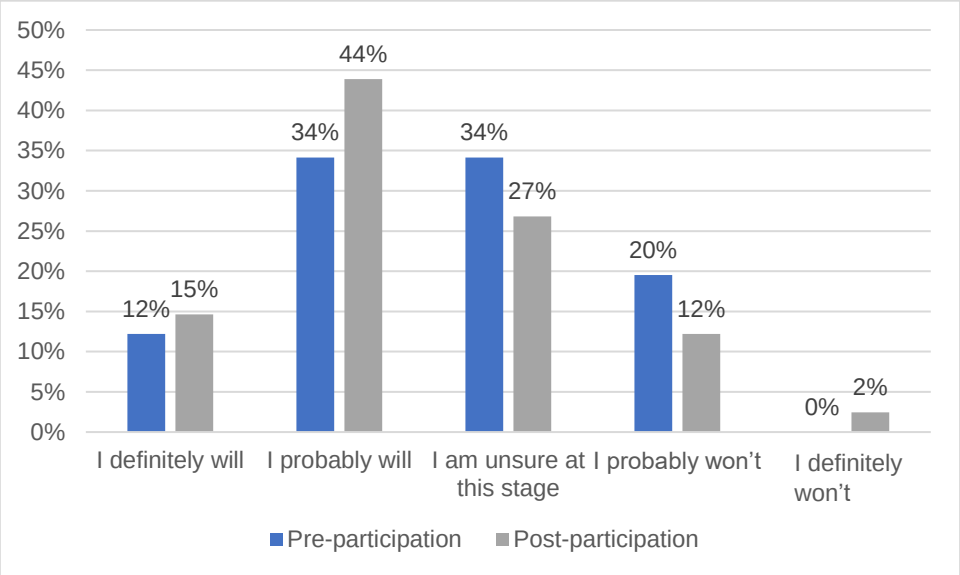


Figure 7. Comparison of responses to pre and post- participation surveys from mentees only in cycles 2 and 3 participation in response to the question "How likely are you to choose a career that involves science?".

- This shows a more modest increase post-participation compared with physics A-level intentions however, the mentee group already had a reasonable interest in pursuing a science-related career (summarised in figure 4).

Comparing results across Cycles 1 to 3

Pre-participation surveys – comparing all three cycles

There were two sets of survey responses considered:

1. Cycle 1 (2018-2019), number of responses = 1005.
2. Cycles 2 and 3 were combined as they took place in the same school year (2019-2020), number of responses = 1838.

Across the surveys there was a similar gender split observed (58/59% female and 40/39% male) whilst some movement was recorded amongst the age groups participating:

- There was an increase in year 9 participation in the survey during cycles 2 and 3 (+2%), a drop in year 10s (-7%) and an increase in year 11s (+5%).

When looking at the split of science courses being taken there was:

- An increase of 10% in those reporting taking triple science by cycles 2 and 3. This was movement came from single applied, double award and double applied qualifications.

When asked to consider their intentions around taking a physics A-level, the respondents become less sure by cycles 2 and 3, as there was an increase of 10% in those reporting they were unsure. However, there was more certainty around intentions towards going into a science-related career with a 12% reduction in those who responded “probably won’t category”:

- By cycles 2 and 3 there was an increase of 7% of those who “definitely will” or “probably will” go into a science-related career, matched by an increase of 6% of those who “definitely won’t”.

STEM club participation remained small across all cycles, with only 2-3% of respondents reporting that they take part in some kind of club.

Post-participation surveys – comparing all three cycles

As with the pre-participation surveys there were two sets of survey responses: cycle 1 in 2018-2019 (number of responses = 89) and combined cycles 2 and 3 as they took place in the same school year of 2019-2020 (number of responses = 99).

The analysis of the post-participation survey has been broken down into two groups: mentees and non-participating pupils.

Mentees

- A higher proportion of females in both surveys: 61% and 66% respectively.
- There was an increased participation of year 10s in cycles 2 and 3 of 37%.
- By end of cycles 2 and 3, there was a 15% increase in those taking Double Award Science and drop of 12% taking Triple science.

When asked “How likely are you to choose Physics at A level?” responses show a net gain of 12% across “I definitely” or “probably will” in cycles 2 and 3. This indicates that the effectiveness of the project has increased between the two school years and reflects the time investment put in by the team to improve the project. This could be particularly linked to the localisation and personalisation associated with the theory of Science Capital Teaching Approach (Godec et al., 2017). This connection is further suggested when the mentee reflection sheets are considered: the most positive feedback was recorded when the mentor had delivered content that was closely linked to the interests and experiences of the mentees themselves.

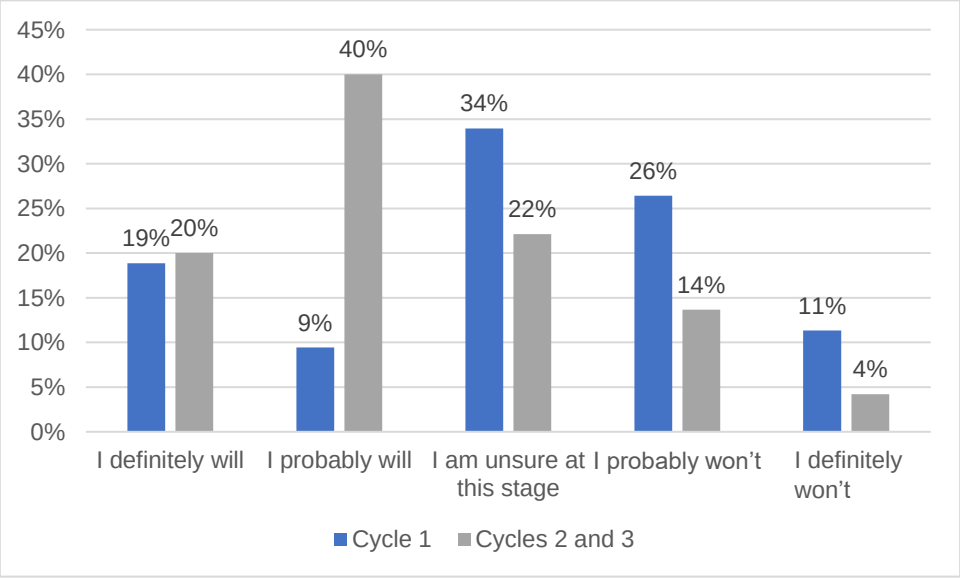


Figure 8. Mentee responses to the post-participation survey question “How likely are you to choose Physics at A level?” from cycle 1 and cycles 2 and 3

- Moving onto the second measure concerning science careers, there was a larger increase of 19% by the end of cycles 2 and 3 in those saying “definitely” or “probably”.

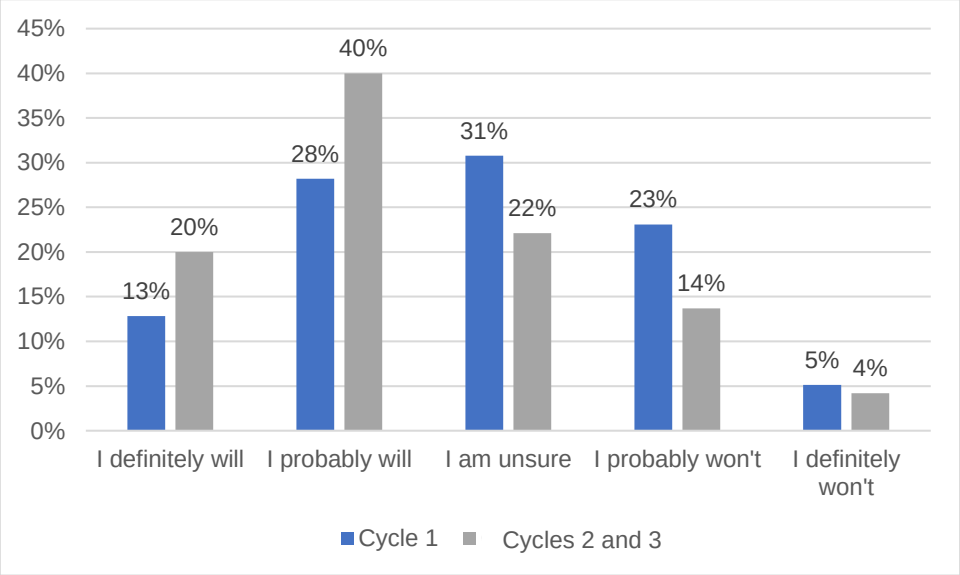


Figure 9. Comparing mentee responses to the post-participation survey question “How likely are you to choose a career that involves science?” between cycle 1 and cycles 2 and 3

Non-participating pupils

- There was a more even gender split in responses by cycles 2 and 3 (49% female and 51% male compared with 64% female and 34% male in cycle 1).
- As with the mentee group, there was a shift to a higher number of year 10 responses: 7% increase.
- Similar increase in Double Award to mentee group: 19% by end of cycles 2 and 3.

No change was observed around intentions to take a physics A-level between the two cycles in the “definitely will” or “probably will” response categories. This supports the assertion that the movement seen in the mentee group towards physics A-level can most likely be attributed to participation in the Physics Mentoring Project.

It is encouraging to see positive progress in terms of impact on mentors between cycle 1 and cycles 2 and 3, particularly as the project team have worked to continually improve all aspects of the project.

Impact on teachers

The impressions from teachers on the impact of participation was sought through a survey at the end of cycles 2 and 3 (7 responses were received). Contextual information provided from the schools about the current teaching situation included:

- They reported 2 specialist physics teachers per school on average.
- There were 5 A-level physics students per school on average, excluding schools without a sixth form.
- The number of pupils required to run a financially viable A-level class ranged from 3-10.

All teachers responded to say that the time commitment related to running the project was manageable. The only highlighted issues related to finding a suitable time to get pupils out of class for the mentoring sessions and out of school for the awards ceremony (2 teachers out of 7).

In terms of supporting the mentors, there was *"Clear communication from Rosie* [the Project Co-ordinator] *on how to support mentors and meet with them to discuss arrangements."*

Teachers have been satisfied with the conduct of the mentors: *"Very impressed by their enthusiasm, communication skills and professionalism."*

Overall, teachers reported that they did not feel as though there had been a wider impact in their school. In some cases, teachers commented that if the university trip (which was cancelled due to COVID-19) had gone ahead at the end of the mentoring sessions in cycle 3 then there would have been an opportunity to further promote the scheme.

A small number were taking part for the first time and would plan to do more to raise the profile if they were to participate again. However, one teacher commented: *“In a school with low engagement like mine, this project could help a lot. It introduces all the fun and interesting parts of physics I just don't have time teach in the classroom.”*

When asked about the benefits of participation to the teachers themselves, they commented they were able to:

- Build partnerships and links with universities.
- Make connections from school physics to the real world: *“I think it has opened the eyes to the opportunities available to them [the mentees] in the field of physics. They have also seemed more interested in physics.”*

- Bring role models into school: *"I think the pupils involved gain a lot from the experience and they enjoy the contact with the university student who is closer to their age and thus makes physics seem more relevant to them."*

Mentors themselves commented on their position as role models through the weekly reflection feedback sheets. They shared their personal experience, (e.g. difficulties in choosing A-levels and making decisions about the future) and the mentors who took this approach reflected that they were trying to respond to how they remember feeling at the same age.

There were various comments from teachers aimed at new schools considering joining. These comments included:

- *"Need to be organised to help the project run smoothly. Only select pupils to participate if there is a realistic chance of studying A Level physics."*
- *"I think my main piece of advice would be to liaise with your mentor over the content of the sessions so that you have an idea of what is being covered (and how) so that you are prepared to answer questions that your pupils may ask."*
- *"Make the pupils realise that they are chosen, but select pupils who want to take part. Pupils who are unsure, seem to not care!"*

It is important for the success of the project that robust relationships are developed with schools, and this is the central role of the Project Co-ordinator. There are a range of different circumstances in schools that need to be taken into account when recruiting schools to the project and also for arranging sessions with mentors. This can be in relation to their setting – urban or rural – and managing expectations about the time teachers will need to contribute to the project. This can be particularly difficult for some teachers if they are not part of a larger department. The project team is keen to stress that the impact of participation on the teachers themselves is as important to them as the impact on pupils.

Summary of impact on female participants

A key area within many STEM initiatives is how to address the gender balance in subjects such as physics, which has an over-representation of males. In Wales around 20% of Physics A-level entrants are female and this has been relatively stable in recent years (Institute of Physics 2020a). This challenge has been a focus of discussion for many years and organisations such as the Institute of Physics (IOP) have worked on various initiatives in schools, resulting in the “Improving Gender Balance” project (Institute of Physics 2020b). The IOP have been running a pilot project in Wales to address gender-related issues in two clusters of primary and secondary schools (Institute of Physics 2020b).

The Physics Mentoring Project, whilst aiming to increase the numbers considering Physics A-level in general, is also concerned with addressing this gender imbalance. This section summarises any differences observed in responses from male and female pupils to the pre- and post-participation surveys from across all cycles of mentoring.

Pre-participation surveys

Across all cycles, female responses to the question of “How likely are you to choose Physics at A level?” were more likely to be in the “unsure”/”probably won’t”/”definitely won’t” categories than males:

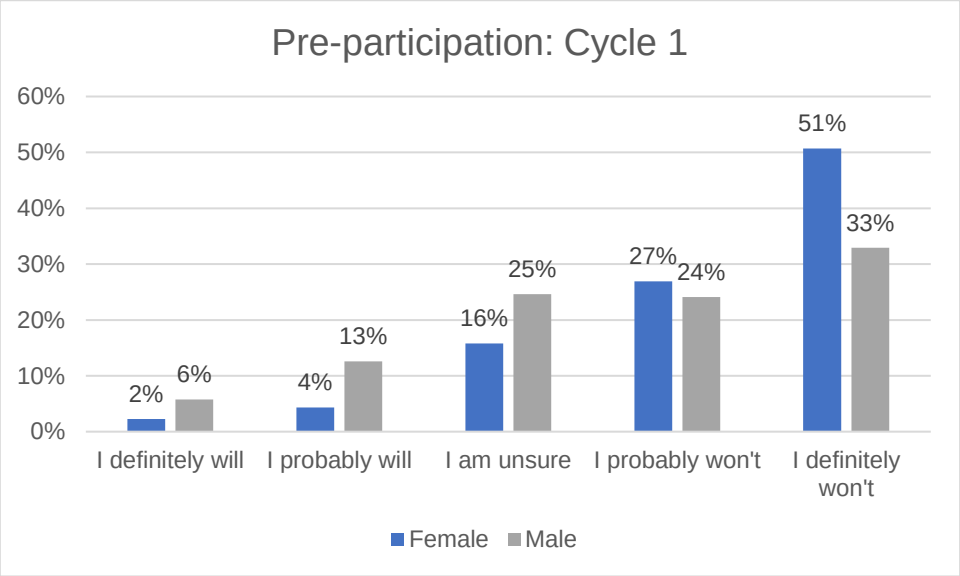


Figure 10. Gender split of responses to question “How likely are you to choose Physics at A level?” in the pre-participation survey in cycle 1.

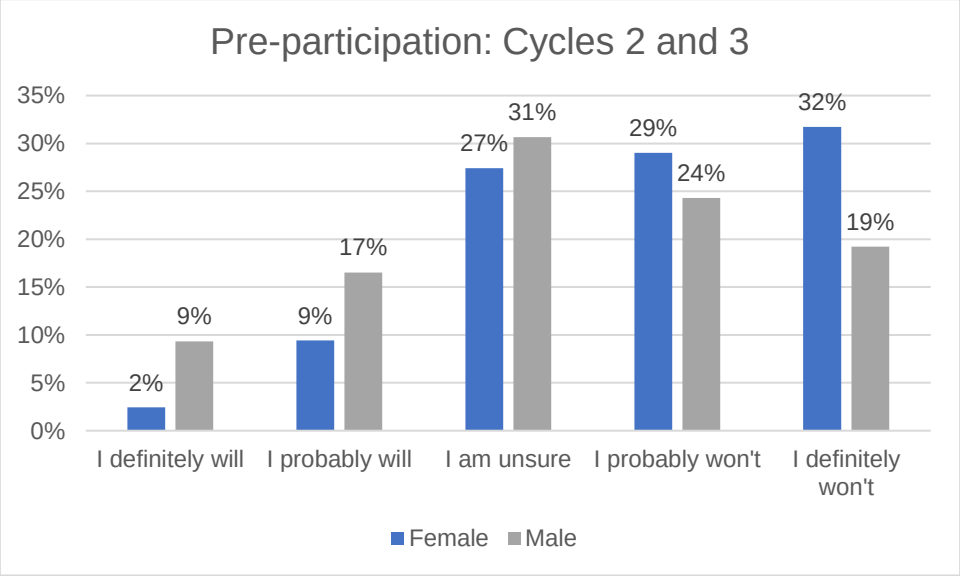


Figure 11. Gender split of responses to question “How likely are you to choose Physics at A level?” in the pre-participation survey in cycles 2 and 3.

Between cycle 1 and cycles 2 and 3 there was a larger increase in females reporting they were unsure versus males: 12% compared with 6%. This could be explained by schools targeting participation towards female pupils. However, when considering the second aspect of interest related to science career intentions there was no clear difference in responses between genders.

Post-participation surveys

Turning now to the differences in impact observed on male and female pupils, there are three aspects considered here: split of science courses being taken, intentions towards physics A-level and intentions towards a science-related career. Again, impact is considered separately for the mentees and non-participating pupils.

Mentees

1. Science courses:

Between cycle 1 and cycles 2 and 3 there was a large decrease in the proportion of female mentees taking triple science: 24% drop by cycles 2 and 3 with the movement going towards double award science. This contrasts with an increase of 9% of males taking triple science.

2. Intentions to take Physics at A level

In the first cycle there was a clear distinction between the genders when it came to A-level choice. Male mentees were much more likely to have been positively affected:

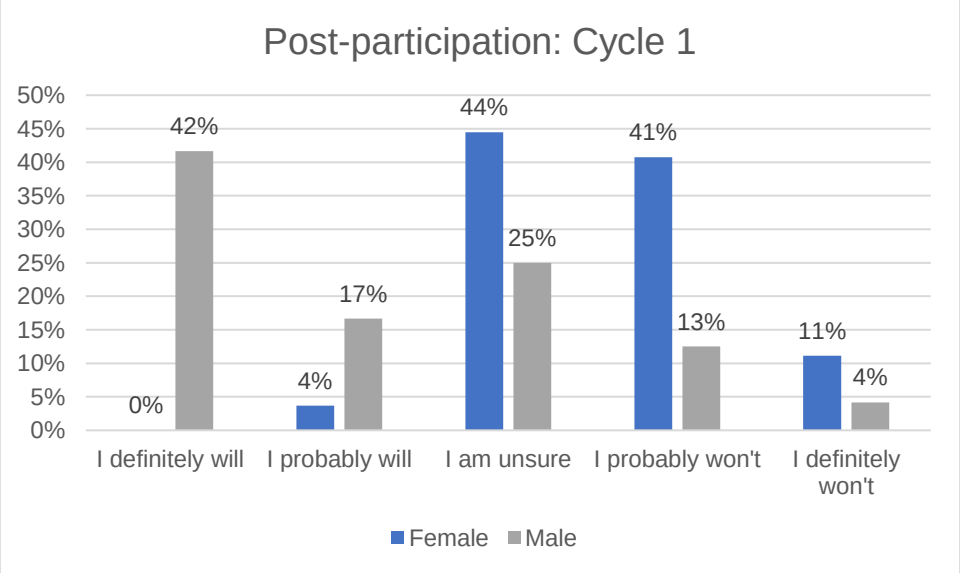


Figure 12. Gender split of mentee responses to question “How likely are you to choose Physics at A level?” in the post-participation survey in cycle 1.

However, there is more positive progress made in cycles 2 and 3:

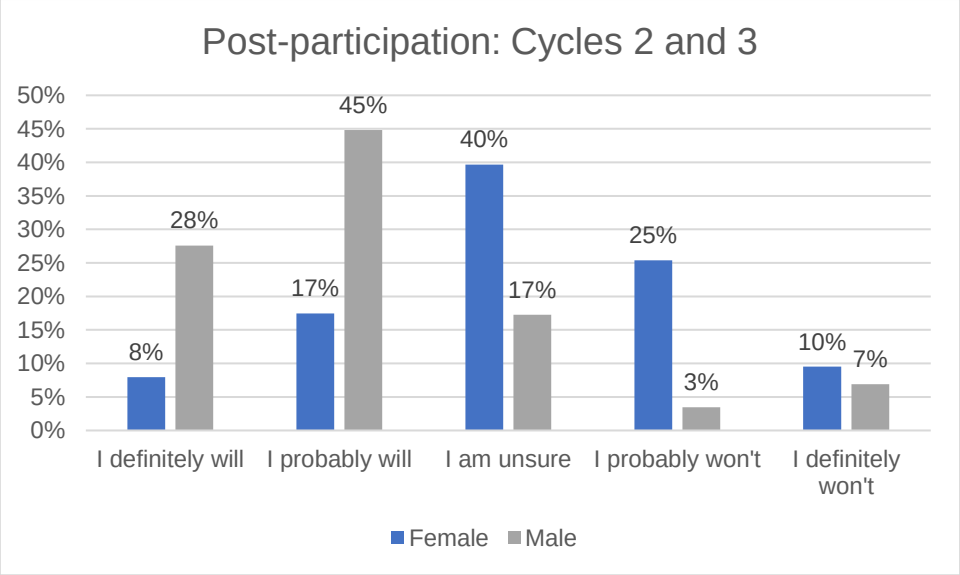


Figure 13. Gender split of mentee responses to question “How likely are you to choose Physics at A level?” in the post-participation survey in cycles 2 and 3.

- When comparing the difference between cycle 1 and cycles 2 and 3 there was a larger increase in the “I definitely will” responses amongst female mentees compared with males: 8% increase versus 14% decrease.
- Looking at the combined responses of “definitely will” and “probably will” between cycle 1 and cycles 2 and 3, there was a net gain of 22% for females and 14% for males.

3. Intentions towards a science-related career

Once again, impact on mentees is considered across the different cycles:

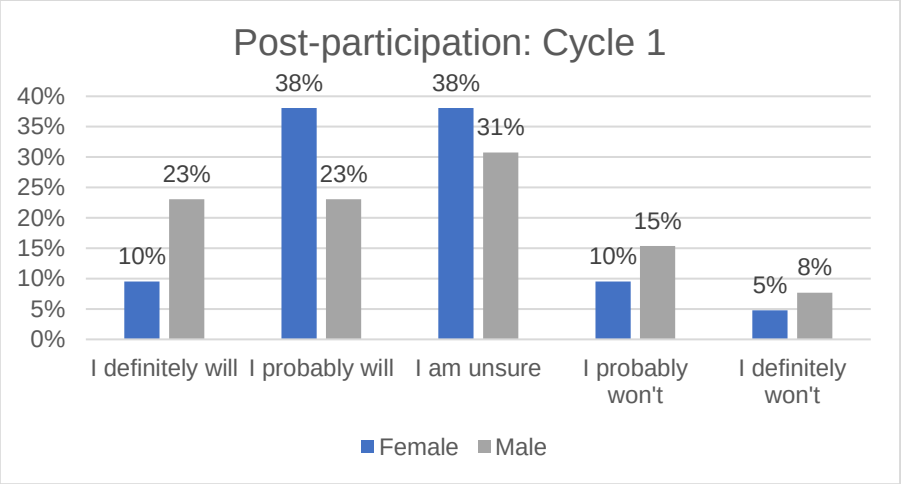


Figure 14. Gender split of mentee responses to question “How likely are you to choose a career that involves science?” in the post-participation survey in cycle 1.

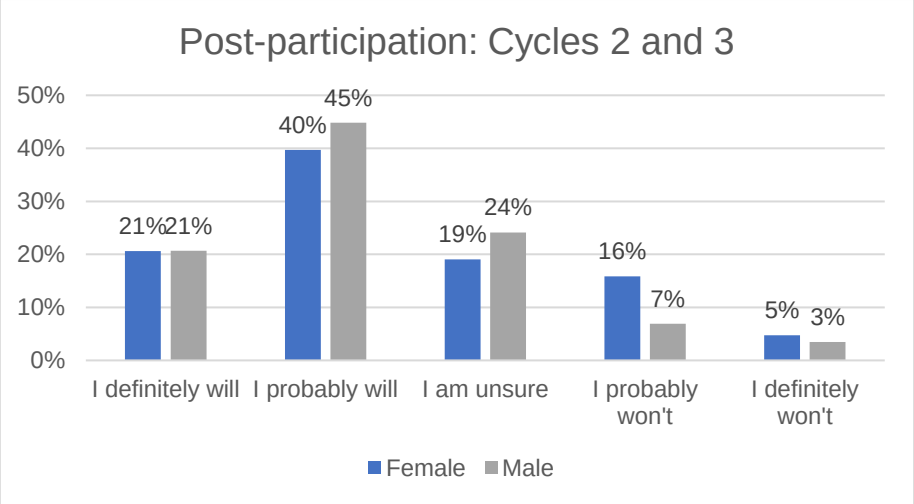


Figure 15. Gender split of mentee responses to question “How likely are you to choose a career that involves science?” in the post-participation survey in cycle 2 and 3.

- A larger proportion of females reported in the “definitely will” and “probably will” categories in cycles 2 & 3, with a more even distribution in cycles 2& 3 compared to cycle 1.

The positive progress made in terms of impact on female pupils at the end of cycles 2 and 3 could be the increased focus and emphasis on the Science Capital Teaching Approach within the training provided to mentors for cycles 2 and 3 having been introduced following the findings of the interim report after the completion of cycle 1.

Benefits of participation on mentors

This aspect was looked at in detail in the second interim report (Rushton & Thomas, 2020), an overview of which is presented here. This is supplemented by further comments from mentors participating in cycles 2 and 3.

Direct feedback from the mentors focussed around the key skills developed as part of the training and mentoring process. In particular these include:

- Organisational skills
- Time management
- Communication skills

"The skills and confidence I've gained I will carry forward to make my day-to-day life easier, and I hope that everything I went through with the mentees made an impact such that some of them consider a STEM-related career"

(Cycle 2 and 3 mentor)

The impact reported by mentors was not just thought to be a short-term effect. There were many future benefits, including:

- Improved confidence in their own abilities.
- Provided valuable experience to include on CV which can be used as a basis for future employment opportunities. This also includes a broad set of experiences to refer to in job interviews.

  "*I think mentoring will be helpful with getting me ready for the world of work not just working with younger people" (Cycle 2 and 3 mentor).*
- For those interested in teaching it provides direct experience of working in schools.

  "Mentoring helped me understand a bit more about what teaching will be like and the work needed" (Cycle 2 and 3 mentor).

As discussed in the interim report, by being able to offer a programme that provides so many benefits to students, universities are supporting the skills development of their undergraduates and opening up employment opportunities adding a very positive dimension to their university experience. This makes a formal contribution to the achievement of graduate attributes deemed necessary by universities. This are necessarily available solely through participation in curricular activities but also through extra-curricular activities (Hill & Walkington, 2016; Hill, Walkington & France, 2016).

Appendix – Evaluation timeline

September 2019	• Reflection sheets reviewed prior to cycle 2 starting. • Survey 1 to pupils.
October 2019	• Evaluators to attend and observe mentor training.
December 2019	• Mentor feedback session at awards and recognition ceremony.
January 2020	• Survey 2 to mentees participating in cycle 2. • Post-intervention interviews with teachers. • Interim report including initial results from cycle 2.
April 2020	• Survey 2 to mentees participating in cycle 3 and rest of school cohorts. • Teacher survey. • Data collection completion. • Project team interview.
May 2020	• Data compilation and clean up, analysis and final report writing.

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This report was written by the Directors of Ondata Research Ltd, Laura Thomas and Dr Lizzie Rushton. Ondata Research collaborates with clients to help them understand project impact, whilst also providing mentoring and support through the phases of project development and delivery.

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