# Best Practice Network school improvement library

## Improving outcomes for disadvantaged students using science

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Tags: Secondary, STEM, pupil premium

### The issue

I used SIMS, SISRA and internal data on an ALPS basis to analyse data from the 2017 exams. This allowed me to identify that disadvantaged students were falling behind non disadvantaged significantly with only 8% of them hitting their target grade in the 2017 summer exams. By analysing the current year 11 I could see the emerging pattern repeating with only 26% on target so I decided to make this the theme of my project.

I also noted from these data tools that the grades of these D students start to decline during year 9.

### The solution

My priority was to improve progress of disadvantaged students and improve individual progress.

**Year 9**

After reading literature on the importance of science capital increasing the experience of science within students’ lives I decided I would use this as a basis for year 9 student’s to improve their disengagement.

I headed a Teaching and Learning group to determine the main barriers to success for disadvantaged students by carrying out a pupil voice questionnaire to ascertain the obstacles to learning for them both at home and at school. My intention was to analyse the findings of this and use it in planning an approach.

I wanted a group of disengaged year 9 disadvantaged students to participate in a lunchtime CREST science award club. This offered them the opportunity to engage in a research and practical based project with a contemporary issue in science and to support them in the writing of a scientific report

For the timing of the sessions I chose lunchtime as I knew the students would be unlikely to attend after school.

The staff team here involved the management of the science technician support staff and the Assistant Faculty Leader for science who would be involved alongside myself in leading this work as part of her appraisal targets.

**Year 11**

I also planned for improving pupil premium progress in Year 11. I lead classroom teachers and the Higher-Level Teaching Assistant (HLTA) to devise a programme of intervention that involved these students. This was arranged for registration time, lunch and afterschool to help suit students and staff alike.

Education Endowment Foundation(EEF) toolkit highlighted the importance of breaking stereotypical views of disadvantaged pupils as a group that are less likely to achieve. These students who had become used to underachieving were going to aim at achieving a CREST Silver award that is recognised by both colleges and universities The high starting point of a silver award was chosen to show students that we believed they could achieve at these levels .

For year 11 students the team were able to consistently push the idea of aiming towards aspirational targets and teach strategies for students to achieve and even surpass their target grades. It was an environment of high expectations where no student was considered unable.

I utilised my role in leading a Teaching and Learning session with teaching staff outside a team. This incorporated collaborating to devise the questionnaire to identify barriers to learning for disadvantaged students.

I collaborated with my faculty staff to deliver intervention sessions for year 11 and CREST sessions for year 9. This incorporated sharing data for the students alongside the findings of the Teaching and Learning group so they had an informed decision on what the situation was. To promote participation by my team, staff appraisal incorporated these sessions into their appraisal targets and steps. This was also a method I used for the year 9 Crest sessions.

From the M Rand R online course I was aware of tools that could be used such as Trello to layout plans so all could see the bigger picture and be aware of where the project was up to at a certain point and I did find this useful in clearly allocating staff to roles and for them to have an understanding of their deadlines.

For the CREST award project I had fortnightly line management meetings with my Assistant Faculty Leader where we set the progress as a standing agenda item.

For the staffing for the intervention in year 11, teaching staff were completing sessions in lunch or after school. The HLTA ran sessions during registration as part of her contacted hours. Her HLTA hours were paid from PP funding from the school.

From following the online course I chose to create a project plan to identify the different stages that would lead to successful completion of this task.

Faculty meetings kept staff up to date and share any changes that occurred. This was essential as I had a non-specialist member of my team on the year 11 intervention programme, who would need to successfully prepare for sessions. I used a faculty meeting as I felt it would clearly show the importance of the project for the students and the school and how it could be linked to our faculty improvement plan and their own appraisal targets. This was done to ensure that all staff could see the importance of the success of the project not only for students, but for the faculty and for themselves.

The project plan stepped out the different steps necessary for the design, implementation and evaluation of the project.

Each year group has 3 data collections. I used these to analyse the progress of students in each of the areas of the projects.

Year 11

Using the collaborative grade boundaries, the analysis of the mock exams from SISRA for year 11 didn’t show a significant improvement but there were steps towards progress. RP2 column showed staff predicting that 27% of the disadvantaged students and by RP 3 44% were under target still which was marginally better. Most students were still below their target grade, however. From analysing the mock exam data on SISRA I was able to look not only as a group but at an individual level at the progress being made by students. By RP2 with these mock results student H was hitting their target and in the analysis faculty meeting all agreed that this student was working at home and motivated to come to us when he needed to so we no longer kept him on the SIMS register. Q,R and T were showing worrying attendance trends, with Q and T showing a dip in their progress by a grade after the mocks. To counteract this I supplied materials for them to use at home and also in a quiet safe space area they would sometimes work in when they did attend.

Year 9

For year 9 CREST students, a staff voice showed that students were more engaged in lessons and had showed some improvement. However, their performance was still significantly below target. The increase in motivation was seen in 75% of the students which was seen as a real gain for the project.

Internal progress data for them shows that still only 1 of the group were on target, 12.5%. However, while the others were below target, 25% of the group had raised their progress by one grade. This along with the greater motivation in class did mean that it appeared to be starting to work.

Year 11

From analysis of the mock exam data it was clear that we needed to reassess how to ensure that the progress of the pupils improved even further. Students were not engaging with revision at home and as we knew that space to study at home had shown as a barrier to learning in the initial questionnaire, we agreed that we would address this in the coming weeks so we opened the science computer suite at lunchtimes to offer study time at lunch and also develop a set of intervention materials for students to use at home. Parents were informed of these materials via email and asked for their support.

Crest awards

Assessment data of these students did show a small improvements at this stage and scientific literacy skills were still below standard. As the investigative aspect was completed it was agreed that the team running the CREST project would now focus on the written report necessary to gain the award. A booklet was provided for the students which broke down the stages of this report to scaffold the work so they could be independent with the team members facilitating.

Alongside the Kotter model, I also considered that Rogers innovation adoption curve was important. I needed to make it clear to all members of each team what I wanted from them and why it was important. I also needed to recognise that members of the team would adopt changes at different rates (Rogers 2003) and so I delegated people to teams based on this. The CREST team needed to be people who were innovators and early adopters as they needed to be enthused with starting the project straight away due to its clear time frame. Mainstream adopters were put onto the year 11 intervention team as it was something they felt more comfortable with. I had some early majorities who were a little concerned about the extra work on top of their already busy schedule. I used the implementing change template to support these colleagues. I found this a very useful and effective tool in predicting potential issues that could affect implementation.

The new GCSE curriculum was challenging. Students were expected to write more extended responses in exams and to apply knowledge more often. We needed to change our teaching practice to incorporate as many opportunities to address these changes as possible. I worked with Heads of departments locally to share planning and preparation which gave us confidence in our teaching and curriculum. We are a small team and had a non-specialist member of staff who was having to teach the Biology to this year 11 cohort. While exceptionally committed and hardworking, there was still an issue with lack of subject knowledge, so I sent her onto a Science, Technology, Engineering and Maths Continuing Professional Development (STEM CPD)residential course where she spent the time developing her subject knowledge and practical skills. I also prepared sessions for her with another member of staff acting as her mentor where she could practice and understand the key areas of the topics she would be teaching. This proved to be successful as she was a real asset to the department and her final results were good.

September to October half term was used to analyse data, to set up CREST and year 11 intervention groups and to begin the sessions.

All staff were involved in data analysis to identify the lack of progress of PP students.

We constructed a list of students from year 11 to put into an intervention session. We considered their barriers to learning based on the questionnaire and pastoral information. Staff were asked to volunteer for a session that suited them with the HLTA allocated to registration.

These sessions ran from October. Staff were asked to prepare materials and resources for their sessions. In December we set a date for analysing the mock exam data and from evaluating this we produced an extra booklet of intervention resources for our specialism. To support this, we sent email communication home to parents to inform them of their child’s underachievement and asking for their support in getting students to complete it. This was surprisingly successful, especially with the buy in of parents and 85% of the work was completed.

Year 9

The CREST team commenced the sessions in September with students spending the first sessions researching potential projects. A contemporary investigation on plastics was chosen.

From October students started the investigative work and this continued until February half term. This gave staff the ability to build relationships with these usually disengaged students while carrying out the practical work. From February students were assessed as still not showing enough progress academically. Staff voice did identify they were much more engaged and participation in lessons improved. To improve their scientific literacy skills from February they commenced work on the written report. To support them the staff scaffolded this so that could complete the necessary paperwork.

Incorporating the project into staff appraisals proved successful in terms of staff buy in.

Interventions fitted in with people’s daily timetables to reduce workload. The HLTA was able to complete the registration intervention as she had no responsibilities with a tutor group – this proved a successful session.

Financially the HLTA hours were paid for from PP funding so there was no additional cost on top.

The CREST award was funded from a grant from the EEF. This grant paid for all photocopying, resources and food for the students involved. It also allowed us to fund students’ places on all school trips throughout the year. Technicians completed preparations in their normal hours and so no extra cost was involved for them. Because we were part of a trial group we were also able to submit our applications for the CREST Silver award free of charge.

The funding we acquired was £600 and the final costings were below this as the budget sheet shows.

For staff training for the non-specialist, I chose STEM CPD training as it is high quality and relevant to the GCSE curriculum and it also has a training bursary impact award which covers the cost of the course and supply teacher costs – so not increasing the budget.

## Impact

The engagement and performance of the disadvantaged students in both groups increased considerably.

In the CREST award pupil voice at the end of the process compared with at the beginning was extremely encouraging. Students had previously not seen the purpose of studying science and felt it had little to do with their lives or their future. They also felt it was difficult and they simply ‘couldn’t do science’. After achieving the CREST award they said they understood that science was a part of their everyday lives and it was important for their future even if they don’t enter a STEM related employment. They were also more positive about their ability to achieve in their subject. They felt a sense of achievement. They had spent a long time writing up reports, which was the type of activity they actively avoided previously. They have also since requested that they can participate in another STEM project. When asking staff about the impact on these students, they have also changed in their participation in lessons – they are more motivated to be involved, complete homework and are enthusiastic in answering questions and coming up with new ideas. In terms of data CREST year 9 students had a 63% increase of students on target and no students were 2 grades below target compared to the beginning where 25% were.

For the year 11 intervention group, the results were very good, and we saw an positive progress score of 0.54 which is a significant improvement to the score of the 2017 leavers cohort of -0.19

The cohort that we had carried out this project with were initially showing a progress score of -0.51 in September 2017 at the start of the project. After 2 months of intervention they had improved to a positive progress score after the mock exams of 0.17. Therefore, to reach a final positive progress score of 0.51 was extremely successful and a reflection of the work that my team had put into them through the intervention project. The percentage of disadvantaged students who achieved their target grade had increased from the previous year by 55% to 63%. This narrowed the gap between Disadvantaged and non-disadvantaged to 1% compared to 13% the previous year

During this project I identified weaknesses in my team and determined suitable CPD for them. This training proved to be highly successful in supplying members with the skills and understanding of the curriculum and exam requirements that they needed to carry out effective intervention. As this CPD was funded through impact awards from STEM CPD it had no effect on our budget and they effectively received high quality training for free. Staff members who attended this training fed back to me on their opinion of it and it was extremely positive.

The NPQML online courses were of great benefit to me personally as they helped me to develop a better understanding of my own role as a leader and how to develop myself to communicate and lead a team of people successfully. I was also able to share some of these strategies with my Assistant Faculty Leader so that she could use them in her work with the technicians in the CREST award project.

I feel that the low costs of this project were extremely effective in our successful pupil outcomes.