

I'm a Scientist, Decipher My Data!

External evaluation report



Laura Grant, 23 June 2012

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Foreword

*Shane McCracken – Project Director
June 2012*

On September 15th 2010 Declan Fleming, a teacher we knew from a previous project, visited our office for lunch and a conversation about an idea he had. That idea grew into Decipher My Data and this report evaluates the success we have had so far with the idea.

Six weeks later Rob Aldridge, an epidemiologist working on a team specialising in influenza, joined the project. We spent 3 months or so working up ideas and testing them with teachers.

We applied to the Wellcome Trust for a People's Award in April 2011 and were told of our success in July. We had an excellent response to our initial announcement of the project, but it is fair to say that since that excellent start, things didn't pan out exactly as expected.

By the time we had ethics approval and built the site we had reached November and faced a struggle to enthuse teachers that late into the term. We weren't unduly worried. A flu outbreak normally guaranteed plenty of media coverage and that would help us generate interest in the project.

But for the first time in about 25 years we did not have a significant flu epidemic. The 2011/12 season had the lowest peak since the Royal College of General Practitioners GP 'Influenza-like illness' surveillance scheme was established in 1966. Since 1988/89 there have only been two other seasons where influenza activity did not cross the threshold at that time.

At the end of March we called an end to the data-gathering aspect of the project. We had 18 schools contributing data. This is much better than any previous study, but well below our initial expectations and targets. It also meant that we did not have sufficient data to write a paper.

We had some ideas of what we hadn't got right. Timing, consent, communication... and we knew we could put them right and expect a flu epidemic in the 2012/13 season. We didn't know if teachers valued the project or if they'd give it another go. In order to answer that question we altered the objectives of the evaluation and asked Laura Grant to concentrate on project delivery issues and ask about participation in a future Flu project.

The response was surprisingly positive and the project team have all committed to provide their time to running the project for a second season. Hopefully this time next year we will be writing a positive evaluation and a ground-breaking scientific paper.

Executive summary

Introduction

I'm a Scientist, Decipher My Data! was a project led by Gallomanor Communications and funded through a Wellcome Trust People award. Through online engagement, it aimed to provide real scientific data for use by secondary school students and teachers. The first experiment – *Flu!* – investigated a possible correlation between illness absenteeism at schools and the proportion of positive influenza samples taken by sentinel General Practices. The project brought together the core team behind *I'm a Scientist, Get me out of here!* with teacher, Declan Fleming and UCL Academic Clinical Fellow, Dr Rob Aldridge.

I'm a Scientist, Decipher My Data! (DMD) had the following objectives:

- Create a project that's easy for teachers and students to get involved in, that delivers a real benefit to science;
- To involve 100 schools and over 2000 students in the *Flu!* project;
- Create 200 interactions between the science team and the schools;
- Have 75 schools report their results.

Findings

The project did not meet the objectives listed above. Thirty-four schools gained consent for the project and eighteen uploaded data to the project website. There was no influenza outbreak over the winter of 2011/12, so it was not possible to test the project's hypothesis.

Decipher my data! Flu!

Help Dr Rob find if school absence data can detect flu peaks early.

Barriers to participation for teachers

It needs to be set up at the end of the summer term so that it is all ready to go and input data from September, it took a long time to get authorisation etc. so we were late starting. (Participating teacher)

There did not appear to be a single large issue that affected teachers' participation in *Decipher My Data!* over the winter of 2011/12. Rather, a number of issues affected different schools in different ways. These included:

- **Teachers' time and competing priorities.** An issue with any school-based project;
- **Timing** – the project required attention during a busy time of year and many felt that lead times were too short e.g. for completing the consent process;
- **Accessibility of school data** and ease of uploading this when it is accessed;
- **Difficulty in delivery as a student-led project.** Roles for students were seen as uninteresting, timing clashed with examinations, and there was some difficulty with student access to the website;
- **Lack of clarity** for teachers around what would be needed to participate/deliver the project, including how much time would be involved;
- **Lack of activity** on the project website e.g. blogs and forums;
- **No influenza outbreak.**

About three-quarters of teachers surveyed said that they would have used the project resources more if there had been a flu outbreak. This would have increased interest and engagement in the project (among teachers and students) as well as providing opportunities to put some of the resources to use.

Indicative outcomes for students and teachers

It was really good for getting students looking at complex data. They really enjoyed the lessons on being critical about data and what it's like trying to publish your work as a scientist - there was lots of great debate about the human element of peer review. (Participating teacher)

Despite the lack of outbreak, some teachers used the resources. They noted two main outcomes for students: better understanding related to How Science Works and interest in taking part in a real research project. Outcomes for teachers included curriculum enhancement and inclusion of lesson plans or teaching ideas in their practice. Teachers were also interested to be involved in a research project.

Future delivery

It was a really useful project to take part in. However it was a bit of a learning curve and I would probably do things a bit differently if I took part again. (Participating teacher)

Almost all of the respondents felt the project was a good idea. However a significant number felt there were problems with the execution. Teachers suggested a number of possible improvements to the project that would make them more likely to get involved again. These are discussed in full in Section 3.8. The largest factors were making it easier to upload data, providing more scope for student involvement and timing the project so that participation could be organised by the end of the summer term. Other suggested improvements were clearer information and expectations from the outset, more ongoing communication, making the consent process easier, better ways to present data and stronger curriculum links.

There is evidence from the e-survey that if some of the barriers to participation can be removed, teachers will be more willing and able to get involved. The survey responses were positive in tone and showed support for the idea behind the project.

The project team identified a great deal of learning from this first iteration of the project. They intend to run the project again having removed some of the barriers. The key changes are:

- **Clarity of the offer** to schools in terms of what the project is about, what will be involved and when;
- **Simplification of the project**, removing some of the non-vital elements such as the outbreak investigation and 'ask a scientist';
- **Increasing the level of openness** in the project, making the consent process less onerous and allowing teachers and students to share their ideas with others.

1 Introduction

1.1 Background and aims

I'm a Scientist, Decipher My Data! was a project led by Gallomanor Communications and funded through a Wellcome Trust People award. Through online engagement, it aimed to provide real scientific data for use by secondary school students and teachers. The first experiment – *Flu!* – investigated a possible correlation between illness absenteeism at schools and the proportion of positive influenza samples taken by sentinel General Practices.

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I'm a Scientist, Decipher My Data! (DMD) had the following objectives:

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- To involve 100 schools and over 2000 students in the *Flu!* project;
- Create 200 interactions between the science team and the schools;
- Have 75 schools report their results.

The project team also identified the following intended outcomes for the project:

2,000 students:

- engaged with and enthused about contributing to a real academic study;
- with better understanding of How Science Works.

100 teachers:

- benefiting from taking part in online science study;
- updating their knowledge about current scientific practice.

1 project team:

- with greater understanding of how to run a data engagement project;
- with improved chances of obtaining funding from other sources for other DMD projects.



2 Evaluation methodology

2.1 Methodology

The evaluation comprised the following methods:

- Monitoring of participation and web use (led by Gallomanor)
- Pre-project teacher e-survey (led by Gallomanor)
- Post-project teacher e-survey and phone interviews (led by external evaluator)
- Interviews with project team members near the start of the flu season
- Debrief discussions with project team after the flu season.

2.2 Evaluation questions

Original evaluation questions

Evaluation questions for students, teachers and the project team were agreed when the evaluation was commissioned. These were:

1. For students:
 - a. What were students' experiences of the project?
 - b. Did students develop knowledge, understanding and/or skills from taking part?
 - c. What was their view of their role in the research process?
 - d. Did it make a difference that this was 'real science'?
2. For teachers:
 - a. Did the project have an influence on their subject knowledge?
 - b. What were the barriers and enablers to their participation, especially in terms of submitting data?
 - c. How did teachers fit the project into their teaching? Which year groups were best suited, and/or was it run as a special project, with a STEM club etc?
 - d. How did this project compare with alternative ways of teaching data analysis?
 - e. What improvements would teachers suggest for future phases of DMD?
 - f. Were there any unintended outcomes at student, teacher or school level?
3. For the project team:
 - a. Is DMD a viable way of contributing to scientific research? What did the project team learn from the process?
 - b. For the team, was the project 'a success'? Why or why not?
 - c. What can this project tell us about open science/open data projects more widely, and does this have implications for future DMD projects?
 - d. Were there any unexpected outcomes?

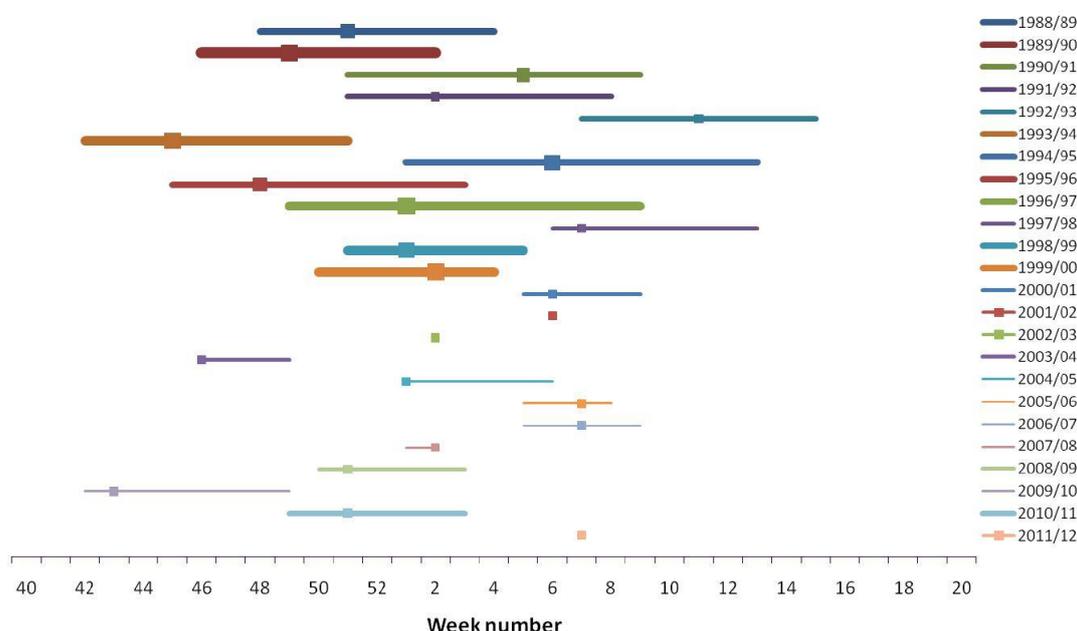
However, the project did not unfold as expected and this led to a change of focus for the external evaluation. This is described in the next section.

2011/2012 flu season

There was no flu outbreak over the winter of 2011/2012. The 2011/12 season had the lowest peak since the Royal College of General Practitioners GP 'Influenza-like illness' surveillance scheme was established in 1966.

Since 1988/89 there have only been two other seasons where influenza activity did not cross the threshold at that time: 2001/02 (peak of 44.9 per 100,000, threshold 50/100,000) and 2002/03 (peak of 30.6 per 100,000, threshold 50/100,000) where the predominant viruses were A(H1N1)/A(H3) and A(H3)/B respectively (from pg 10 of HPA annual seasonal influenza report http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317134705939).

Figure 2. RCGP GP ILI consultation activity, England and Wales, 1988 to 2012*



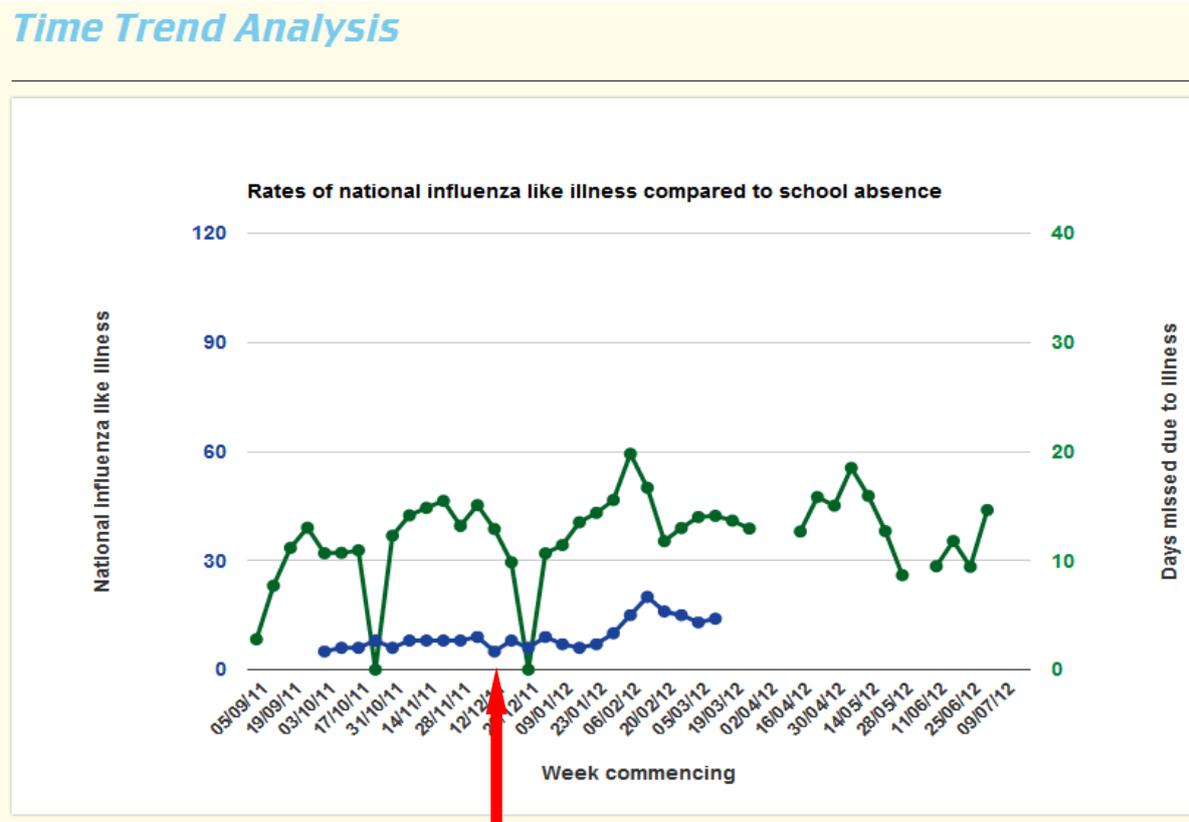
This graph from the RCGP shows how unusual the lack of flu outbreak in the 2011/2012 season was in comparison to the last 25 years or so.

Participation in *Decipher My Data!* was also lower than anticipated. For this reason, the focus of the teacher e-survey was shifted slightly to address the following key questions:

- What were the barriers to participation for teachers?
- How important was the lack of flu outbreak? Were resources used anyway?
- Is the issue with the project related to its core idea, or the way it was executed?
- What improvements could be made to increase teachers' participation?
- Is it worthwhile to run the project again over winter 2012/13?

This evaluation therefore focuses on project delivery more than outcomes. With low participation, it was not possible to gather a large amount of evidence on teacher and student outcomes, although there are some indicative data.

The lack of flu outbreak is seen in the data collected on the project site.



There was no flu outbreak over the winter of 2011/2012. The blue line is the influenza-like illness data and the green is all school absences.

3 Project metrics

Almost 300 teachers expressed an interest in the project following an email in the summer term of 2011. Of these, 83 registered for the project in the autumn term of 2011. 32 teachers completed the consent process, and 18 uploaded data to the project website. A summary of these metrics is provided in the table.

Nature of involvement	n
Expressed an interest	352
Registered for the project	83
Secured consent	32
Uploaded data	18

This level of participation was lower than anticipated and fell below the project aim of involving 100 schools.

The site launched on October 19th 2011.

The restrictions we imposed on ourselves, though ensured complete and secure anonymity of participants, meant there was very little to see unless you were logged in. Deeper analysis of visitor behaviour when compared to data from our I'm a Scientist project shows that those who did visit Decipher My Data engaged for longer and more deeply.

Metric	
Visits	6,529
Unique visitors	3,781
Page views	26,808
Home	7,764
Data entry	1,994
Analysis	1,901
Meet the scientists	747
Lesson Plan One	577
About Flu	381

80% of IAS visits were one-offs, 42% of DMD visits were from visitors who came back. Over 20% of visits came from people visiting more than 8 times. This shows that we engaged with the core audience successfully.

Findings: teachers, students and schools

3.1 Samples

Pre-project survey

The pre-project survey was distributed in October 2011 and was completed by 21 teachers. A full report is provided separately, although findings are summarised in this report (See Section 4.2).

Post-project survey

127 teachers were invited to complete the post-project survey. These were drawn from the database of teacher participants as follows:

- All teachers that gained consent and/or uploaded data to the website;
- Half of teachers that registered for the project¹;
- A third of teachers that expressed an interest but did not register².

^{1,2} These samples were selected at random by taking every second/third teacher on the list.

Five teachers opted out of the survey, which left 122 potential respondents. 57 teachers responded, representing a response rate of 47% overall. This is broken down by the nature of teachers' participation in the table below.

Participation	n invited	n completed	% response rate
Uploaded data	17	14	82%
Gained consent	13	6	46%
Registered	27	14	52%
Expressed interest	66	23	35%
Everyone	122	57	47%

The response rate is highest for those with the greatest level of involvement, and lowest for those with the least involvement, which is unsurprising.

In order to reduce bias in the survey responses, telephone calls to all unresponded teachers that had gained consent or uploaded data were made. 17 teachers were contacted in this way. Several agreed to subsequently complete the survey, and two were interviewed over the telephone (their responses were also entered into the survey software and are reported alongside other teachers' responses).

3.2 Pre-project survey

The full pre-project survey report is available separately. However some key findings are provided here.

The survey asked teachers to rank a set of intended outcomes for the project. They ranked outcomes for students most highly, as can be seen in the table over the page.

Intended outcome	Mean rank
Students have a better understanding of the scientific process	1.6
Students feel they can do real science	2.3
Students are more aware about data reliability, complexity and confounding variables	4.1
Students are more aware about flu and epidemiology	4.1
Students feel more confident working on complex datasets	4.1
I will be more confident in teaching data analysis to students	5.2
I will be more confident in using publicly available datasets in my teaching	6.6

Other useful findings included:

- Only three teachers had used publicly available data sets before.
- Nine teachers said they would be running the project in lessons as enrichment. Five said they would run it in lessons as part of the scheme of work, and five were planning to run it outside lessons with a STEM club or group of sixth formers.
- Different teachers were planning to run the project with students across Key Stages 3-5, from Year 7 to Year 13.

- Over half of respondents were planning to spend four or more lessons on the project.
- When asked what appealed to them about the project, responses can be summed up in the words of one teacher: *'real data, real science'*.
- A few teachers commented on how the project would be student-led.

The remainder of this section reports findings from the post-project survey.

3.3 Barriers to participation

Post-project e-survey respondents that said they had not gained consent, used the website or uploaded data were directed to this part of the survey. They were invited to list up to three things that prevented them getting more involved.

The factors identified in response to this question were:

- Time (10)
- Workload/low on priorities (8)
- Unexpected factors e.g. illness, job change, Ofsted (6)
- Lack of approval/interest from colleagues including senior management (3)
- School did not consent/took too long to gain consent (3)
- Seemed complex / a lot of work (3)
- Lack of access to absence data (2)
- Hard to organise student participation (2)
- School not eligible (2)

Responses included:

It seemed quite complex to do it properly

We had a science Ofsted inspection in the Autumn term, so the project got forgotten about!

Unclear how much time would be required

Difficulty in deciding on a suitable group to participate who had time in their curriculum

Extreme workload pressures at this time

Enthusiasm from other teachers (lack of)

Suspicion that school data might not be available

No consent from school - think they did not understand that the data would be confidential

The same question was asked of teachers that *had* gained consent, used the website or uploaded data. These teachers also identified time and workload pressures as a barrier (true of any school-based project), but also mentioned the following constraints:

- Timing – lead time for planning, clashing with exams;
- Challenges in making the work student-led;
- Difficulties accessing school data;
- Lack of flu outbreak/trends in data;

For some, time and timing were particular challenges because they wanted the project to be student led.

Timing - ran the project with Y10 triple top set and they have modular exams in December and January

Time - especially because I wanted the project to be student led

Access arrangements for students in lessons. Had to organise access to laptops/be in computer room, and didn't want to give them my login as I use the same password for other accounts

One teacher described taking time to understand the project:

I was on a big learning curve too about terminology etc. - was really good for my development but I did need to invest a fair amount of time to make it work and could have done with more time - not a criticism of project so much as a general comment!

Some felt that the nature of the data set itself had acted as a barrier:

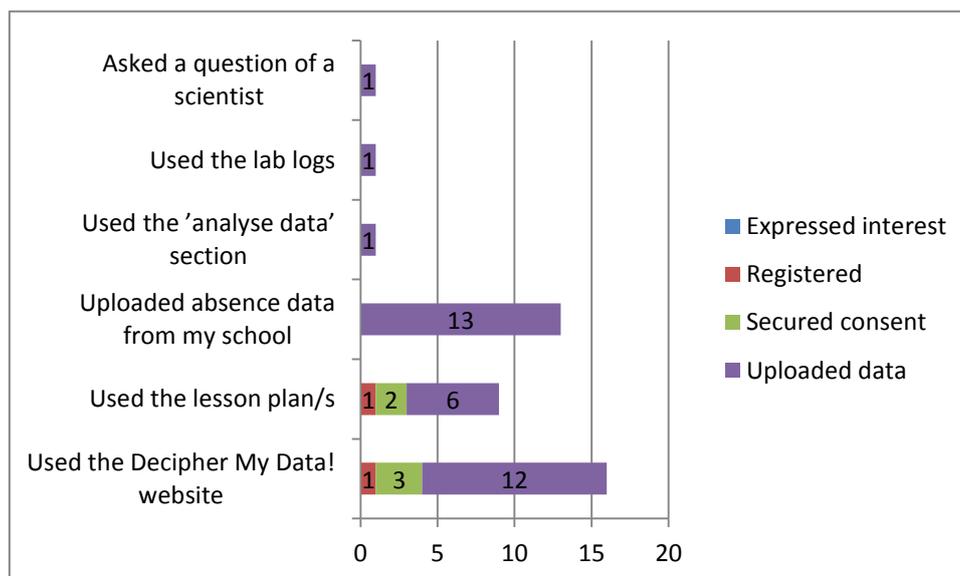
Lack of flu outbreak

Lack of definite trends stopped me using it as part of a lesson so far

3.4 Project resources

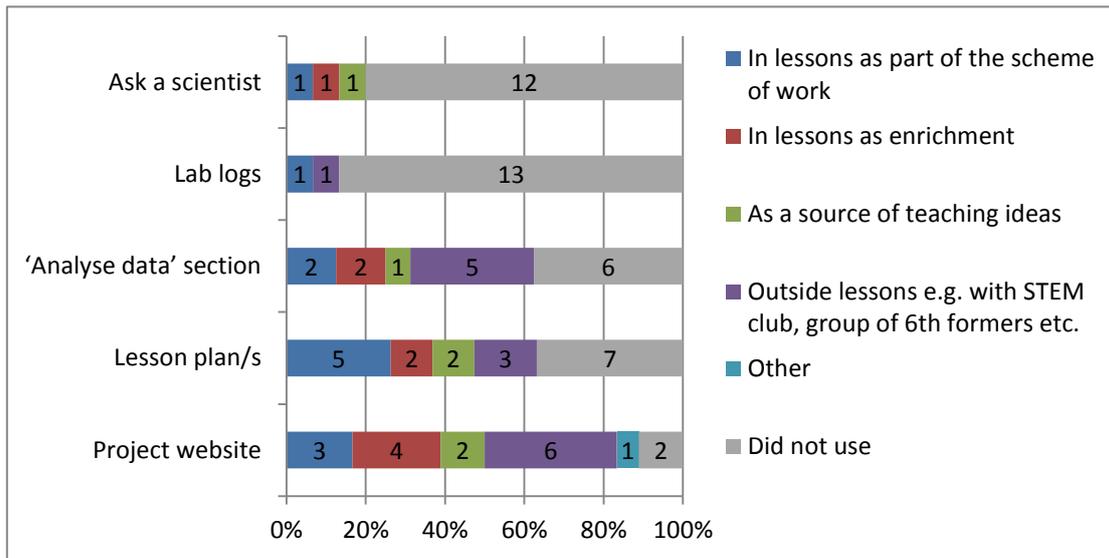
The 20 respondents that had participated in the project were asked which resources they had used and how they had used them.

Please tell us which parts of the project you did:



It is clear from the chart above that teachers who uploaded data were also most likely to use the other project resources.

How did you use the following elements of the project?



Respondents were asked to describe how resources had been used. Several commented on the lesson plans, although not all teachers had used them:

The lesson plans looked good but I didn't get far enough to use them

I linked the project to AQA Biology B1 Infectious diseases.

Intended to run lesson plans with STEM club. May still do so in future.

I used the earlier lesson plans with GandT pupils in Y8, but they were possibly a bit over pitched and the pupils didn't engage with them as I had hoped

Used lesson plans as an introduction to the project.

Two teachers described using the website as an introductory resource:

Used project website to introduce pupils to idea of data gathering.

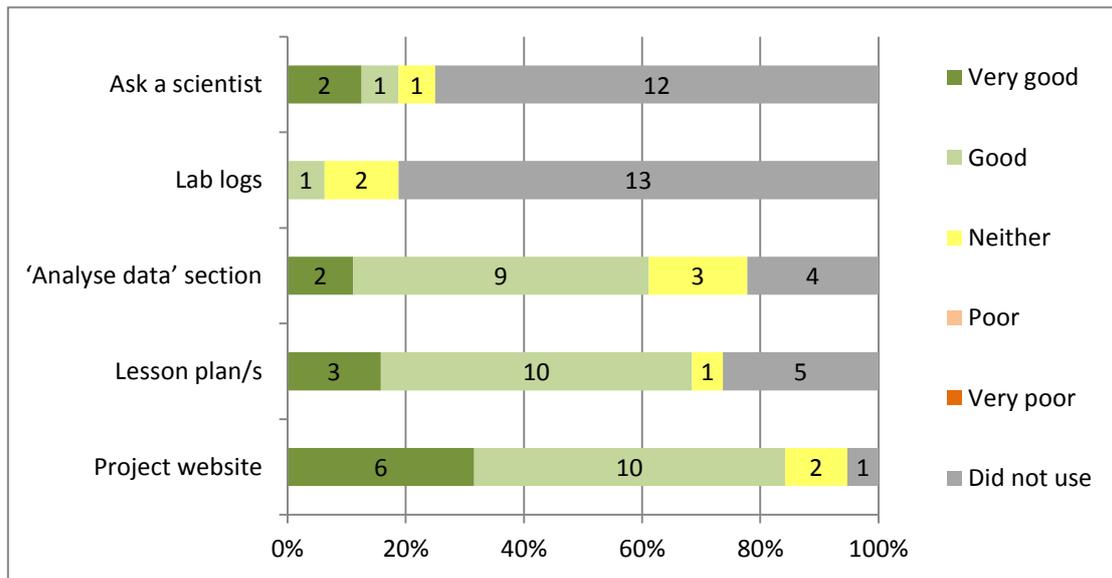
Used the website as an introduction to investigations and experimental planning

One teacher had used their own school absence data in a lesson:

The students had a few lessons where they were given the school absence data and had to work out the numbers for each year group. We then had a look at the graph as a class to see how we compared to other schools

Teachers were also asked to provide feedback on the quality of the resources they had used.

Please rate the quality of the following elements of the project:



Responses were generally positive in tone. All responses are included in this section as they are varied and useful.

Two teachers commented on the lesson plans. One school had used these widely and feedback from several teachers had been gathered ahead of completing the survey.

The lesson plans were of an unusually high standard and will be used again. We could only see the national data on our data section not school data.

Lesson 1 went really smoothly but we had issues logging in and it kind of went downhill from there. We got confused about how some kids couldn't log in and it took a while to work out they were trying to register as a teacher even though we'd given them the specific link to go to they weren't following our instructions! It got a bit chaotic after that with some kids wanting to move on and others frustrated at being unable to get the site working. There ought to have been a break in the graph for the holidays, the students found the drop to zero and back up very distracting. The students (and teachers) needed more guidance on what to look for - there was too much of a leap between the facebook graph and all the data they were presented with on the site. It would have been good to just say "click this to look at variable 1 and variable 2, your graph should look a bit like this .. can you see that variable 1 is high here - why might that be?" much more structured .. we understand this is hard to do as you don't know what the data was going to look like but you could make up some data. One teacher was unable to access lesson plan 3 for some reason .. other teachers in the same school could see it on their laptops but not on hers.

Two teachers commented on the consent process, about how useful the supporting documentation had been.

The explanation of the project was very good and the supporting documentation, such as consent forms, was helpful.

The consent process was straightforward. I went to the head with the letters that were provided and told her all the data would be anonymous and she agreed straight away. We also sent letters to parents and put it in our bulletin, I copied and pasted the information provided so there was no hassle with that side of it.

Three teachers commented on the process of uploading data. One found this straightforward, others less so.

Generally, fine. It was easy to upload information and good to see graphs instantly.

Inputting data was a bit clunky. I probably overlooked the option to upload from a spreadsheet? That would be much more user friendly

*We did manage to get access to all of last year's absence data but it seemed we couldn't use this. Maybe finding a way to use historic data would get around some of the inputting problems.
[Teacher that did not upload data]*

Two commented on the interaction with scientists:

*The students enjoyed being able to ask questions and were eager to check for replies
Maybe an overlap with IAS would be good. Livechats? I didn't use the 'ask a scientist'.
Don't think I realised it was there to begin with*

And there were three other comments:

It is a great idea but unfortunately we just didn't get round to it - I hope to use resources like this in the future

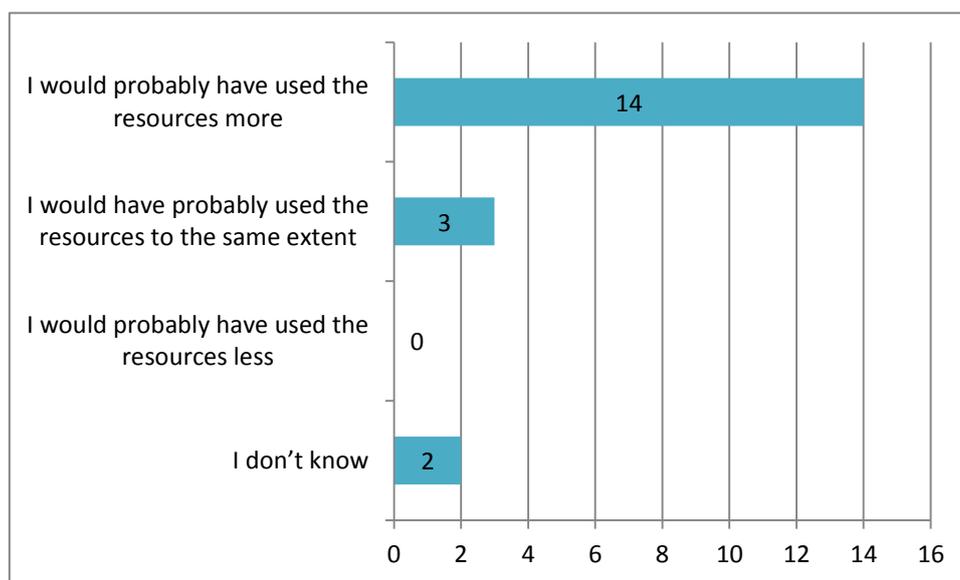
It's a really good project, it links well with the course.

Found analyse data section not very easy to use

3.5 Lack of flu outbreak

Teachers were asked about how the lack of flu outbreak affected their engagement with the project.

If there had been a flu outbreak, do you think you would have used the resources differently?



Most respondents said that they would have used the resources more if there had been a flu outbreak. Four teachers described how a flu outbreak would have increased interest and engagement in the project – for them and their students.

This would have provided an impetus to the project within school. That is, it would have moved up my to do list.

If the pupils had felt their data was vital to the global data set, particularly if an outbreak had been foreseen, they may have engaged with it differently

The group I used lost interest and, to be honest, so did I. If I did it again, I think I'd enter data from October without involving the students and only introduce it to them after Christmas.

Three described how an outbreak would have enabled them to use the data and resources more fully.

The lack of an outbreak made it difficult to develop the use of the data.

Would have encouraged Maths to take up project and follow it through to next year.

The inputting was the biggest issue. I would have been more likely to use the lesson plans if there had been an outbreak.

One teacher that said they would have used the resources to the same extent commented:

We probably would have used the data section a bit more but the low levels of incidence made it hard for the kids to see patterns.

3.6 Outcomes for students and teachers

Student outcomes

Two main student outcomes were articulated in the responses:

- Understanding how science is done in the real world;
- Interest in participating in a real research project.

Eight teachers described how their students had benefitted from the project in these ways:

It was really good for getting students looking at complex data. They really enjoyed the lessons on being critical about data and what it's like trying to publish your work as a scientist - there was lots of great debate about the human element of peer review.

Learnt about seeking consent before using data and the kinds of information scientists use to classify data into groups. Enjoyed the 'importance' of taking part in a national research project.

But for four teachers, impacts were limited due to their limited participation in the project.

Unfortunately I don't think they got much, if anything out of these lessons.

One teacher described their aspirations for the project:

Sadly we never moved beyond the initial interest stage. I had planned to organise the project as a Lower Sixth run activity. This would have given the students a realistic idea of Scientific research and allowed them to participate in a nationally important piece of work. More pragmatically, it would also have been relevant and useful for University applications next September. I would also have wanted to involve the Maths department as there was a clear opportunity to discuss the mathematics of epidemiology. Some years ago we ran a joint Biology/Maths simulation of a disease outbreak within the school and this worked extremely well.

Teacher outcomes

A number of outcomes for teachers were identified:

- Three teachers commented on ways the project had enhanced some of the 'how science works' aspects of the curriculum.
- Two described how they intended to continue the work from the project.
- Two liked the idea of being involved in a real research project
- Two teachers described how the project had prompted the school to do other analysis of its absence data.
- Two left other comments.

Responses included:

Frustration, and a nagging sense of guilt.

Helped with getting students to understand the different ways in which scientists work - how science works ideas.

Interesting to join in with a nationwide project.

School started to analyse trends between years in absence as well as timing.

I can see the benefit of using REAL data, and have ideas how to better run the project in school with different target pupils

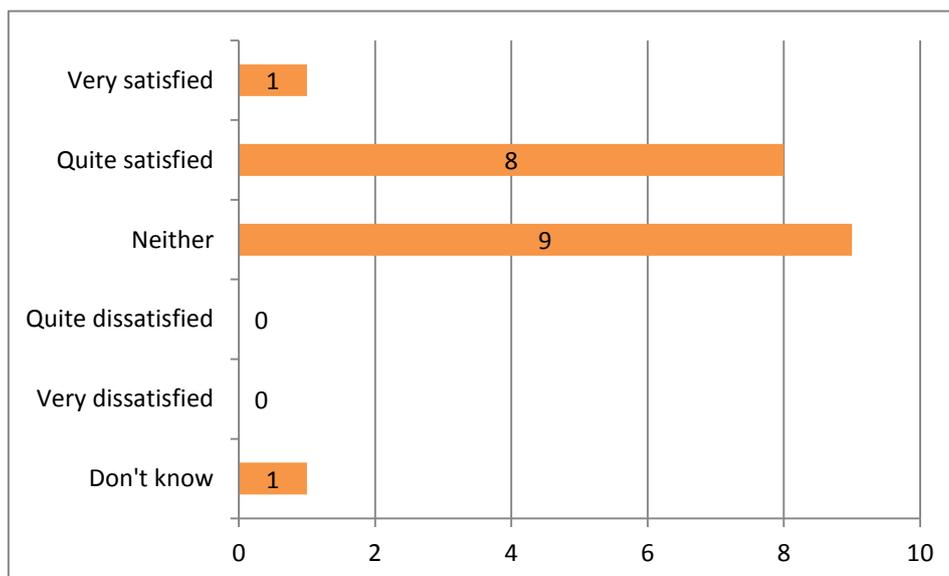
Enhanced the curriculum by using data in a 'real' situation.

*All teachers at the school commented they would use lesson plan 2 and 3 on their own in future as standalone lessons even if the project didn't go ahead again. Teachers felt like they themselves learnt a lot about what it was like to be a scientist - more than one commented about how silly it was that we teach kids about science yet many of us teachers have little idea about what it's actually like *being* a scientist.*

3.7 Satisfaction with the project

Teachers that had gained consent or uploaded data were asked about their satisfaction with the project overall.

Overall, how satisfied were you with the Decipher My Data! project?



Satisfaction levels varied. The teacher that responded 'don't know' said:

Difficult to comment as we made so little progress.

Two teachers that were 'quite satisfied' commented on the lack of flu outbreak:

Although I'm happy we didn't have a flu outbreak the lack of an outcome made some of the pupils somewhat sceptical about the value of science.

I didn't use it to its full potential, but the lack of a flu outbreak didn't help 😊

Teachers that said they were 'neither satisfied nor dissatisfied' felt the project did not work as they had planned, or that there was less student engagement than they had hoped.

I did not have the necessary time or the appropriate classes to make best use of the project.

It was perhaps my own fault that we didn't fully engage with it, but equally the forums didn't really take off in the way I thought they would, so pupils didn't keep the buzz going

A really good idea to use in teaching/as a project, just difficult to get students involved as I had to spend large amounts of time collecting absence data and then all students needed to do was read out from the data I had collected, whilst another student entered the data.

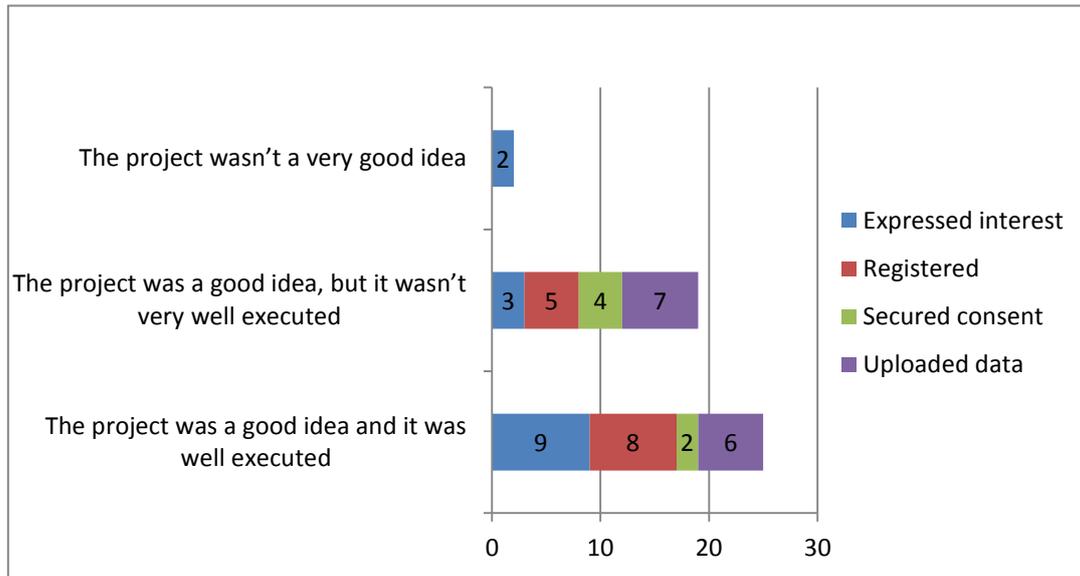
The project could have been student focussed. The way it was set up I could have entered all the absence data and not involved the students at all. It could be improved to be more student orientated

3.8 Future involvement

The project team needed to know whether there was enough support for the project to make it worth running again. The final section of the survey included a series of questions that aimed to provide evidence for this decision.

All respondents were asked the questions in this section of the survey, regardless of their level of involvement.

Please tell us which of the following statements most accurately reflects your view of *Decipher My Data!*



It is worth noting that a number of teachers expressed a lack of confidence in their judgement of the project in the open responses to this question.

Teachers who said the project was a good idea and was well executed relied on their perceptions of the website and resources to make this judgement. One also commented that the resources had become incorporated into the relevant scheme of work at their school. Another mentioned timing as the factor that prevented their participation.

The resources looked really good.

I just came to it too late and was catching up. Would be brilliant if it could be set up in the summer term

Resources from this project are now incorporated into our phase 1 SoW. Therefore, we would very much like to be involved next academic year.

Some teachers said that the project was a good idea, but not well executed. There was little consensus around any major issue; instead a number of concerns were raised.

Three of these respondents commented on student involvement.

I found it difficult to know what the students were being asked to do. Need more clarity and brevity.

Collecting and inputting data was not that engaging for students, and it was problematical to organise access.

Needs to be more student based

Another teacher here mentioned timing, and described how the process had worked in their school:

Only in issue of timing. I would need to have the documentation in place well before the project was due to start. I would like to be able to approach SLT for permission to go ahead and get all the paperwork organised with assemblies to launch the project properly. SLT had to make a decision about whether there was any issue relating to data protection. They did approve the project eventually but it took about three weeks for this to be actioned. By this time, several other issues had arisen which took priority over this one. I would like to be able to seek the approval at the end of the summer term when there is less of a time pressure on staff. I could launch this with my colleagues and get it into the school calendar. I would like to be able to give notice of this to the students and their parents in advance so I would be more likely for them to participate.

Timing in relation to examinations for participating students was a barrier for another teacher.

I could not justify lessons when my top set were taking Biology and Chemistry exams in Jan and there was still a lot of syllabus to cover.

Two teachers hinted at the idea that there was no single issue with the project, but that there were a number of barriers. The subsequent lack of engagement was off-putting for one teacher.

See above comments on website, bad luck with flu levels, more support needed for LP2

Mainly well executed but clearly teacher/school engagement wasn't great and there was no motivation to make the effort

Two teachers responded that the project wasn't a very good idea. One of these left a comment:

It was a good idea but you need to have someone in your department who has the time to manage it. This year it wasn't possible and you are also relying on someone outside of the department to give up their time to provide access to the necessary data

Q *how many people die from flu a year in england&wales?*

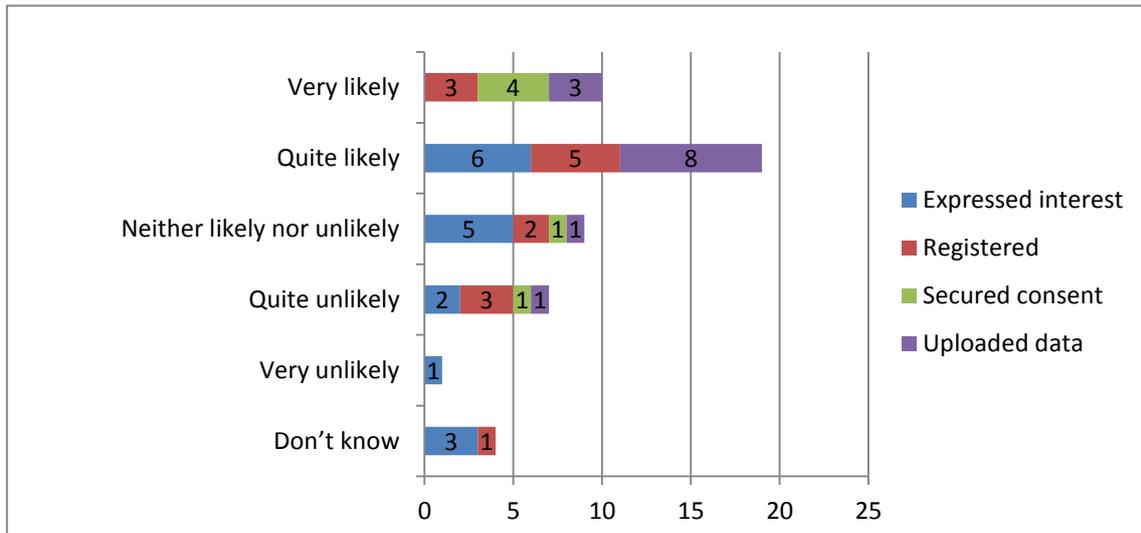
Comments Off | [Edit](#)

A [robaldridge](#) answered on 7 March 2012

Answer:

It varies greatly every year depending on the strain of flu. The complicating fact about answering this question is that we don't test for flu in everyone that dies in England and Wales and so we probably miss quite a lot of cases. However, one way we try to examine how many people are dying from flu each year is by estimating the number of people that die over and above what we would expect every year as a consequence of flu – this is what we call excess deaths. Again it varies every year depending on the strain of flu, but is somewhere around 3,000 people in a typical year, but can go up to 20,000 in a high epidemic.

If the project was to run again in a similar format over the winter of 2012/13, how likely is it that you would get involved?



Teachers were asked to list up to three things that the project team could change to improve the project that may make them more likely to get involved. The issues identified were:

- **Making it simpler to upload data (9).** This included tools to extract data from SIMS, the facility to use previous years' data sets, making inputting generally simpler, and providing student logins.
- **Starting earlier (10).** Teachers said that an earlier start would ease some of the time pressures. Several mentioned that having everything set up by the end of the summer term would be preferable.
- **Clarity and brevity at kick-off (6).** Teachers felt that instructions should be simpler and clearer so they know exactly what they need to do and when. Clarity about time implications was mentioned specifically by two respondents.
- **More ongoing communication/interaction (5).** These teachers would have welcomed more blogs and greater opportunity for interaction between students and scientists. This included opportunities for students to comment on their work.
- **Make the consent process easier (4).** This was a barrier for these teachers.
- **Presenting data (4).** These teachers suggested improvements to the way data are presented. Two mentioned that the inclusion of school holidays was a problem. Others wanted to see their own school's data compared with the larger set.
- **Curriculum links (3).** These teachers suggested stronger and clearer curriculum links to help prioritise the work in school. One teacher suggested cross-curricular links.
- **Suggested additional resources (5).** These teachers suggested additional resources. These were: a paper copy of the table to give to admin staff, certificates students could print of for recognition, data resources about other outbreaks or infection control, links to other relevant studies and websites.

Comments included:

How closely linked to the curriculum was it? It would help avoid time pressure issues if it could be fully integrated.

Be able to put in school holidays so graphs don't dip in holidays

It needs to be set up at the end of the summer term so that it is all ready to go and input data from September, it took a long time to get authorisation etc. so we were late starting

Make getting consents easier

Avenues for pupils to comment on the project. It could be their findings, questions, what they have done

More communication (Regular blog e.g. weekly)

Clear and key points instructions

If there could be a way to use last year's data set that we had access to.

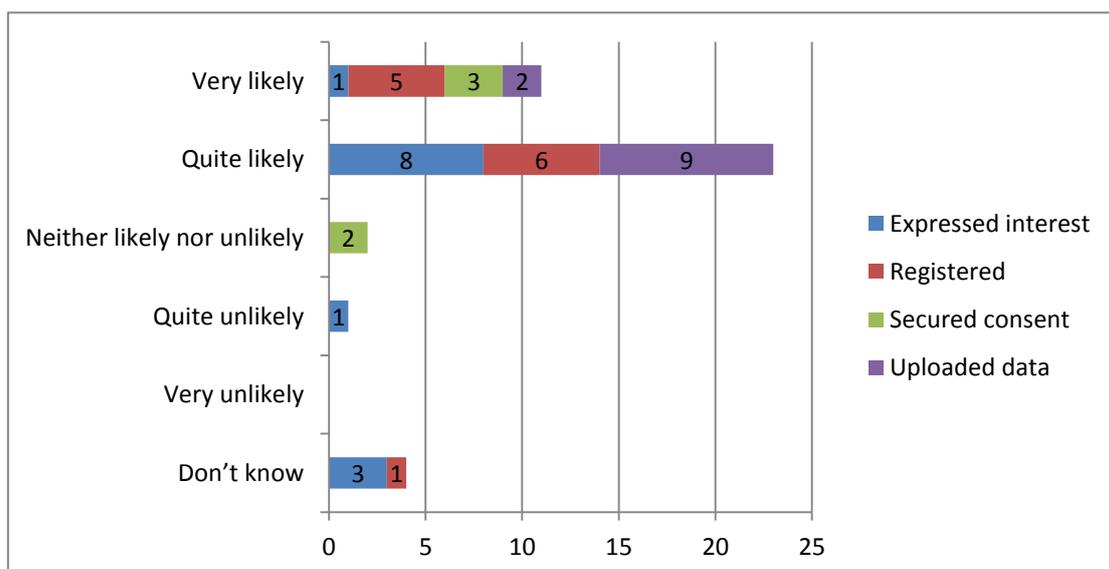
Devise simple tools to extract data from school data software (e.g. SIMS, Facility CMIS, etc.)

Be clear about the work involved by pupils and teachers

Face to face start-up meeting

To explore how much difference these changes could make, teachers were then asked to indicate how likely they would be to get involved in an improved project.

If the project team were able to make the improvements you just suggested, how likely would you be to get involved?



The response to this question suggests that making changes to the way the project is implemented would increase participation rates.

Respondents were also asked to suggest anything else affecting their likelihood of getting involved in a similar project next school year.

Teachers' time and competing priorities were the biggest additional factor (mentioned by 13 respondents).

As I am moving to a new school and a new role - no longer HOD I will have the time to organise forms etc.

*It always depends on the time of year and what other pressures are on me at the time!
The summer terms are often easier timewise to set things up for future events.*

The next biggest concern (mentioned by 6) was which classes teachers would have next year, and whether they would be suitable for the project.

My teaching groups. I teach all 3 sciences to GCSE so it would depend what I was teaching and to which groups.

Two teachers also mentioned the extent to which students could get involved as a factor:

I would be more likely to do the data collection as a lunchtime activity rather than in lesson. Pupils could then feedback data to other pupils as part of lessons. This all depends on student uptake for the activity.

Making it easier for students to take the lead.

Some made other suggestions:

When it comes to using data on something like this - I met huge resistance - despite the fact that it was for a project such as this. I feel that this will always be an issue for certain schools

A review of this project that I could give to the Headteacher when I ask for permission again. This would enable the head to see how the first project went, and convince her that we should carry on being involved.

Q **what other animals can catch flu**

Comments Off | [Edit](#)

A [robaldridge](#) answered on 7 March 2012

Answer:

Unfortunately there's no definitive list of animals that can catch flu that I can give you, however, you might be able to work out some of the animals that can catch flu for yourself by the names of some of the more recent strains of flu. Does bird flu and swine flu sound familiar?

So yes, pigs and birds can definitely catch the flu, and in fact wild birds are one of the natural hosts for flu. You might be wondering about whether pets such as cats and dogs can catch flu? It seems like with most of the strains of flu don't infect them – but obviously flu can mutate so this could change.

Several teachers left other comments in the final open section of the survey. These were all supportive.

Hope it all goes well next year.

I could really see the benefit of this data being used and for the students to be a part of this project - the How Science Works aspect to it is really of benefit to the students. It also ties in with the AQA Science A and Biology specifications

An interesting project. I'll join in again next year if possible.

I think these types of project are very worthwhile. We have been involved in a number of similar and the benefits in developing an understanding 'How Science Works' are very clear. It is so refreshing for students to participate in activities where they don't know what the results will be before they start. We need to move them away from always wanting/expecting the 'right' result.

It was a really useful project to take part in. However it was a bit of a learning curve and I would probably do things a bit differently if I took part again.

3.9 Reflection on teacher feedback

This conclusion to the Section on teacher findings reflects on the revised evaluation questions.

What were the barriers to participation for teachers?

There did not appear to be a single large issue that affected teachers' participation in *Decipher My Data!* over the winter of 2011/12. Rather, a number of smaller issues affected different schools in different ways. These included:

- Teachers' time and competing priorities. An issue with any school-based project;
- Timing – the project required attention during a busy time of year and many felt that lead times were too short e.g. for completing the consent process;
- Accessibility of school data and ease of uploading this when it is accessed;
- Difficulty in delivery as a student-led project. Roles for students being uninteresting, clash with examinations, difficulty with student access to the website etc.
- Lack of clarity around what would be needed to participate/deliver the project, including how much time would be involved;

How important was the lack of flu outbreak? Were resources used anyway?

About three-quarters of teachers said that they would have used the resources more if there had been a flu outbreak. This would have increased interest and engagement in the project (among teachers and students) as well as providing opportunities to put some of the resources to use.

Despite the lack of outbreak, some teachers used the resources. They noted two main outcomes for students: better understanding related to 'how science works' and interest in

taking part in a real research project. Outcomes for teachers included curriculum enhancement and inclusion of lesson plans or teaching ideas in their future practice. Teachers were also interested to be involved in a research project. An unexpected outcome was that two schools began conducting further analysis of their own absence data.

Is the issue with the project related to its core idea, or the way it was executed?

Almost all of the respondents felt the project was a good idea. However a significant number felt there were problems with the execution. Again no single idea emerged strongly from the findings, with different issues being important for different schools. For example, timing was a key barrier for some, while others struggled to make student-led activities work well. Some that had used the lesson plans found the web access problematic.

What improvements could be made to increase teachers' participation?

A list of these improvements can be found in response to Q15. The largest factors were making it easier to upload data, and timing the project so that participation could be organised by the end of the summer term. Other suggested improvements were clearer information and expectations from the outset, more ongoing communication, making the consent process easier, better ways to present data and clearer curriculum links. Interestingly, providing more support for those taking student-led approaches was not mentioned in response to Q15, although this was an important theme that emerged from other parts of the survey.

Is it worthwhile to run the project again over winter 2012/13?

There is strong evidence from the e-survey that if some of the barriers to participation can be removed, teachers will be more willing and able to get involved. Despite many teachers having a less than ideal experience with the project, the survey responses were very positive in tone. In other projects, it would be usual for a survey to be a space for participants to vent their frustrations and some negative and even nasty comments would be expected. The positive tone in responses to this survey suggests that there is a high level of goodwill towards the project team, and that many appreciated what the project was trying to achieve. A number commented on the quality of the resources, even if they had been unable to use them. Positive existing relationships with Gallomanor through *I'm a Scientist!* are also likely to have contributed to this.

Based on the feedback from the survey, it appears there are many barriers that will differ between schools. This means that there are a number of concerns for the team to address and improve.

In terms of future recruitment, there are two possible approaches: encouraging as many teachers to apply as possible with the expectation that there will be significant attrition at each stage of the project, or very targeted recruitment to a smaller number of schools, providing some individual attention to support participation.

4 Findings: project team

4.1 Sample

Three interviews were conducted with the DMD team members between October and December 2011. The full report from these initial interviews can be found in Appendix 2.

At the end of the project a debrief meeting with the project team was held over Skype, where the findings from the teacher survey were discussed. And the decision made to run the project again (funders permitting) over the winter of 2012/13. A closing interview with the Project Director also took place in June 2012 and a SWOT analysis of the project's strengths, weaknesses, opportunities and threats was completed.

4.2 Strengths and weaknesses, opportunities and threats

Based on data collected through the evaluation and discussion with the project team, a SWOT analysis was discussed with the Project Director:

Strengths	Weaknesses
<ul style="list-style-type: none"> • Good idea with demand from teachers for projects and resources in the area of data analysis. • Flu is a good subject because it is familiar and relevant to students. • Very strong initial level of interest from teachers, although this did not translate into uploading data. • Goodwill in feedback from teachers in e-survey. • The expertise and commitment of the project team. 	<ul style="list-style-type: none"> • Tension between medical research which is usually anonymous, and public engagement which is about openness. E.g. teachers were not able to share lab logs on the website. • Underestimated the amount of complexity required for the website. • Late launch, late clarifying the offer to teachers. • Requires lengthy involvement from teachers. • Difficult for students to be involved.
Opportunities	Threats
<ul style="list-style-type: none"> • Strengths are still evident: good idea, flu still a good subject. • Project team remain committed and plan to run DMD <i>Flu!</i> again. • Large amount of learning has taken place. Now able to be much clearer about the offer to teachers. • Now able to invite teachers earlier with a clear offer. • Planning to have more openness in online engagement, e.g. with lab logs (subject to ethical approval) • Broadening project beyond flu. 	<ul style="list-style-type: none"> • Ethics committee may not approve the requested changes. • Lack of funding/extension – commitment to project is still there but other work will take precedence. • No flu outbreak again • Too little resource to make desired changes to website. • Not sure that student involvement issue has been fully addressed.

4.3 Reflection on evaluation questions

Feedback from the interviews and debrief with the project team are drawn together here to reflect on evaluation questions 3a-d (for a full list of evaluation questions see Section 2.2).

Is DMD a viable way of contributing to scientific research? What did the project team learn from the process?

The results of this first project are not conclusive, as there was no influenza outbreak. However, levels of teacher engagement were lower than anticipated. Several areas of learning were identified that the team felt would support success next time. These were:

- Clarity of the offer to schools in terms of what the project is about, what will be involved and when;
- Simplification of the project, removing some of the additional elements such as the outbreak investigation;
- Increasing the level of openness in the project, making the consent process less onerous and allowing teachers and students to share their ideas with others.

The main thing is that we're more clear in our own heads on what we're offering. Compared to last time [when] we sent something out in July saying we were doing a very exciting project, I'm not sure we even mentioned it was about flu. This time we're clear its flu, can say when it starts, when the teachers can log on etc. It's a massive and important step forward. (Project Director, end of project debrief)

For the team, was the project 'a success'? Why or why not?

Near the start of the project, the threshold for success (the minimum outcome required for interviewees to feel that the work they had put in was worthwhile) was agreed to be enough schools submitting data for a research paper to be published. The Lead Scientist felt that twenty-five schools would meet this threshold.

If we didn't get at least sort of twenty-five schools I'd say, signed up and submitting data until March I'd be disappointed. (Lead Scientist, initial interview)

All interviewees pointed out that there were several preconditions to meeting this goal, related to how accessible and engaging the project is for schools.

I think if we found no teachers entering data or if we didn't hit at least 25 teachers having entered data by the end of March, I'd be very disappointed. Whether there's enough data or whether it shows that there's a relationship is irrelevant but if we've made it too complex, too difficult for teachers to actually participate in this and I'm using the collecting data as the main indicator on that. (Project Director, initial interview)

The team felt that this first iteration of the project had not been successful. However, they felt that the learning gained would help make the next stage successful.

The central idea about helping students to create and analyse their own data is very strong. The call from teachers is enormous. What we did last season was pioneering and is a step along the way. There were some failures: timing, ethics, lack of outbreak. But just because we didn't achieve as much as we wanted [is] no reason to stamp on this. (Project Director, end of project debrief)

For the next stage of the project, the success criteria are similar.

Success is still having a significant number of schools uploading data – a clear indicator that teachers find it worthwhile. We would want 50 schools to have done at least 3 weeks uploading. (Project Director, end of project debrief)

What can this project tell us about open science/open data projects more widely, and does this have implications for future DMD projects?

The main implication identified related to the ethical aspects of the project. The team identified a fundamental tension between anonymity of research participants and online engagement, for example where teachers might be blogging about trends in data at their school. It was clear that a greater level of openness was needed to make the project engaging enough for schools to stay involved. This means lifting some of the ethical restrictions in order to collect the data in the first place. The ethics application for the new, more open version of the project is awaiting approval at the time of writing this report.

Were there any unexpected outcomes?

The level of teacher participation was unexpected because there had been such strong interest in the project initially. Reasons for this have been discussed earlier in the report. There was also evidence from two schools that participation had led to them analysing their own absence data more closely.

Appendix 1: Teacher e-survey questions

1. Introduction

This is the electronic survey for the *I'm A Scientist – Decipher My Data!* Project.

We are interested in your feedback whatever your level of involvement in the project, and are just as interested in hearing from teachers that didn't participate as from those that did.

Your feedback will shape the way that projects like these are developed in future. If you have any questions about this please contact Laura Grant laura@lauragrantsassociates.co.uk

Please answer completely honestly – no names of schools or individuals will be used in our report. Thanks!

1. Which of these best describes your participation in the project?

- I participated in the project by using the website, data set and/or lesson plans, by getting consent from my school and/or by uploading data [direct to Section 3]
- I registered an interest in the project in Summer 2011 but did not get consent for my school to take part [direct to Section 2, skip Section 3]
- I have not registered an interest in the project or been involved in any way. [direct to Thank You page]

2. What stopped you getting more involved?

A large number of teachers registered an initial interest in *Decipher My Data!* In July 2011, however only a small proportion of these ended up taking part in November 2011.

2. Please tell us up to three things that prevented you getting more involved in the project.

1.
2.
3.

[skip to Section 4]

3. Questions for project participants

These questions are about the different aspects of the projects and what you and your students got out of taking part.

Please feel free to skip any questions that you feel are not relevant given your level of involvement in the project.

3. Please tell us which parts of the project you did:

- Used the Decipher My Data! website
- Used the lesson plan/s
- Uploaded absence data from my school
- Used the 'analyse data' section
- Used the lab logs
- Asked a question of a scientist
- Something else

4. Did anything prevent you from getting more involved in the project? Please list up to three things here.

1.
2.
3.

5. How did you use the following elements of the project?

	In lessons as enrichment	In lessons as part of the scheme of work	Outside lessons e.g. STEM club	As a source of teaching ideas	Other	Did not use
Project website	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lesson plan/s	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
'Analyse data' section	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lab logs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ask a scientist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Please tell us a bit more about how you used any resources:

6. If there had been a flu outbreak, do you think you would have used the resources differently?

- I would probably have used the resources more
- I would have probably used the resources to the same extent
- I would probably have used the resources less
- I don't know

Please tell us a bit more about your response:

7. Please rate the quality of the following elements of the project:

	Very good	Good	Neither good nor poor	Poor	Very poor	Did not use
Project website	<input type="radio"/>					
Lesson plan/s	<input type="radio"/>					
'Analyse data' section	<input type="radio"/>					
Lab logs	<input type="radio"/>					
Ask a scientist	<input type="radio"/>					

Please tell us why you think this. We are especially interested in suggestions for improvement.

8. **What, if anything, did your students get out of being involved in the project?**
9. **What, if anything, did you get out of being involved in the project?**
10. **Were there any other outcomes from the project that have not been mentioned?**
11. **Overall, how satisfied were you with the Decipher My Data! project?**
 - Very satisfied
 - Quite satisfied
 - Neither satisfied nor dissatisfied
 - Quite dissatisfied
 - Very dissatisfied
 - Don't know

Please tell us what made you give the answer above:

12. **If you have any other comments or feedback about your involvement in the project, please leave it here:**

4. The next stage of the project

These questions are about whether and how the project might continue. Your responses to these questions will directly influence how the project is developed – so please be completely honest!

13. **Please tell us which of the following statements most accurately reflects your view of Decipher My Data!**
 - The project wasn't a very good idea
 - The project was a good idea, but it wasn't very well executed
 - The project was a good idea and it was well executed

Please add any further comments if you would like to:

14. **If the project was to run again in a similar format over the winter of 2012/13, how likely is it that you would get involved?**
 - Very likely
 - Quite likely
 - Neither likely nor unlikely
 - Quite unlikely
 - Very unlikely
 - Don't know

15. **Please list up to three things that the project team could change to improve the project, that may make you more likely to get involved:**

1.
2.
3.

16. If the project team were able to make the improvements you just suggested, how likely would you be to get involved?

- Very likely
- Quite likely
- Neither likely nor unlikely
- Quite unlikely
- Very unlikely
- Don't know

17. Please tell us anything else that affects how likely you would be to get involved in a similar project next school year:

18. If you have any other comments please leave them here.

5. Thank-you

Thank you for your time and your feedback. It is greatly appreciated.

Appendix 2: Findings from initial project team interviews

9 February 2012

1 Introduction

Background

I'm a Scientist, Decipher My Data! (DMD) aims to give secondary school students the opportunity to collect and analyse data as part of a real scientific investigation. The *Flu!* experiment is the first in a series of DMD projects, and will involve students from up to 100 schools correlating illness absenteeism at their school with the proportion of positive influenza samples taken by sentinel General Practices.

Initial interviews

Three interviews were conducted with the DMD team members between October and December 2011. This brief report provides an account of the project initiation and development and identifies successes and challenges to date. The interviewees also described the outcomes they would expect for the project to be deemed a success.

2 Interview findings

Getting started

Motivations

The project was conceived as a result of the Teaching Consultant's dissatisfaction with some elements of school practical science. His vision was for science lessons where students had the opportunity to do real scientific research, rather than repeating experiments with a well-known outcome. All three of the interviewees recounted this:

When you're learning science you're essentially repeating what someone else has done, whereas if you're in art you create something and that's yours, you're an artist. (Teaching Consultant)

If they're in an English lesson they get the chance to become a writer; if they're in a design lesson they get to become a designer, but with data and science they never get really the chance to become a scientist. (Lead Scientist)

When a student in English writes a poem they become a poet, but when they take part in a science lesson in a lab they're not becoming scientists. One of the reasons is because they're doing things which have been done many times before and the teacher knows darn fine well what's going to happen because that's why they're doing it. (Project Director)

It was clear that the interviewees were motivated to participate in the project by this idea, which was seen as innovative and important. In addition, each individual had further motivations for being involved. These fit broadly into the following categories:

- Scientific: collection of data for epidemiological research;
- Engagement: interactions between students and scientists;

- Personal/professional: the desire to be doing excellent and innovative work – in science, education and/or public/online engagement.

The project has the potential to be win-win-win for science, education and engagement. However this also meant that a balance between the different goals of the project needed to be negotiated.

Project initiation

The idea for DMD came from the Teaching Consultant, who had a Fellowship which gave him some time to develop it. He had participated in one of the other projects run by the Project Director, who was based nearby. They met for lunch in summer 2010 to discuss several ideas:

At this point I hadn't fleshed out the idea of it, it was actually just having a conversation with [Project Director], he's a great guy to have a conversation with and he can pull ideas out of you and he's good at asking you the right questions to help you sort of express and formulate your ideas. (Teacher Consultant)

The idea was developed further, and the Lead Scientist came on board in November 2010. For him, the project was an opportunity to develop a research idea that he had been discussing with his line manager:

You have these [ideas] bubbling in your background but it's not until the elements come together that you go, "Bing!" And it was a bit like that; I'd thought about, my boss here had thought about, schools and the surveillance of influenza ... he sort of put those ideas in my head and then I went and looked at the literature and found these two previous studies and thought, "Well, this is it." So it wasn't a eureka moment or anything like that but it was sort of joining the dots basically. (Lead Scientist)

The two previous studies referred to in the quote addressed a similar research question to DMD *Flu!* about whether school illness data can be used as an early indicator for influenza outbreaks. Both studies had proven inconclusive because it was not possible to gather enough data from schools.

Finding the right scientist to get involved was crucial. As well as the research background and interest in the project, they needed to be at the stage of their career that would enable them to devote the necessary time and energy.

I think one of the major difficulties is getting the right project and the right scientists, because [potential scientist collaborator] he's such a busy guy, he's someone you've got to book an hour's appointment with you know, about a month in advance and if he's going to be involved with this then he needs to be able to give up more of his time. (Teacher Consultant)

The project was further developed with the Lead Scientist's input. The team applied for a Wellcome Trust People Award in April 2011 and were notified of their success in July 2011. This meant that there was relatively little time to develop the project if it was to be delivered in time for winter 2011/2012, when the next influenza outbreak was likely.

We needed to choose either to run it this winter or the winter of 2012/13 and as you can imagine it would have been really dull to leave it until 2012/13, utterly boring. (Project Director)

So the decision was made to start immediately.

Successes and challenges

Timing

As suggested in the previous Section, timing to deliver the project was fairly tight as the data needed to be collected over the winter. It also appeared that many aspects of the project development such as the website and writing the lesson plans were less straightforward than anticipated.

It's been harder than expected, I'm not naive and I wasn't expecting it to be all plain sailing and I was expecting that the grand visions that we started off with weren't going to happen in their entirety, but it still has been hard. (Project Director)

Ethics

Gaining ethical approval for the scientific study took longer than anticipated. This was one area of the project where expectations differed. From the Lead Scientist's perspective, gaining ethical approval took some time but was not problematic.

Because it is a research project we've had to go through ethical approval and I think that, culturally, was a new thing for [Project Director] – and it's a good process, ethics, but I think it's a bit difficult to bring it all together ... It probably felt like it took a long time and was difficult, but actually it's been pretty smooth. And it was a lot of work to put the proposal together to the format that the ethics committee needed and made us think about a lot of important things. (Lead Scientist)

However for the Project Director and Teacher Consultant, compromises had to be made in the flexibility of the offer to schools that took a frustrating amount of time to work out. The short delivery timescale and the Lead Scientist's caution because it was his first UK ethics proposal also exacerbated this issue.

With hindsight, some areas where greater flexibility could have been built in were identified:

I feel that I've been putting lots of barriers in [Project Director]'s way and saying, "No, you can't do that because we didn't agree that on the ethics committee." Like, we've had to say that it's only the headmasters can give consent on behalf of the school because that's what we put on the ethics form. In retrospect we should have defined it better and said that it could have been the headmaster or a senior management person. (Lead Scientist)

Simplification

Throughout the ethical approval and project development processes, considerable simplifications were made to the data sets requested from schools. The interviewees agreed

that effective engagement of teachers and schools was essential: without this too little data would be collected for a valid scientific study, undermining the vision for the project.

We need to make sure that we provide value for teachers that's ongoing, it's not just limited to a couple of lessons and that they're going to want to continue updating their data over the year. (Teacher Consultant)

The 'outbreak investigation' part of the project was made optional, and the amount of data schools were asked to submit was reduced.

The school absence data, we've simplified quite a lot, we were originally going to ask schools to probably submit about thirty-two numbers I think it was, each week. And we've gone from thirty-two to eight. (Lead Scientist)

Another success in this area was the development of a web tool to simplify the uploading process for schools.

One of the companies that runs the software for school absences, it's basically a database where someone in the school says, this child is off today and that sort of thing. He's got them to write a sort of report that they, the schools involved will be able to sort of click a button and it will give them the numbers ... So that's also simplified things massively. That's a real bonus that we've managed to get them to do that. (Teacher Consultant)

Team

The extent to which the team had been able to balance the goals of the project was seen as a success by all. It was clear from the interviews that all the team members were very committed to the project, and that they recognised the high level of commitment from their colleagues.

They're doing it because they really, really believe in it and they want to make it happen. And that's a joy, so it is great. [Project Director]

However there had been a few tensions, mainly between the scientific data gathering or accuracy elements, and making the project activities and materials accessible and engaging for schools. One example related to the language used in some of the materials.

In the school curriculum or in GCSE specifications you'll see the word 'causal' crop up and of course as soon as you say the word causal to an epidemiologist they'll want to talk to you for 15 minutes about how you can't really say causal. And you're like yeah I know, but this is at a 14, 15, 16 year old level and it's right that we probably ought to suggest that causal isn't a word that we want them to chuck in but we want a lot of balancing to be done over things that [Lead Scientist] wants in order to get the experiment right and things that we can supply in order to make it practical. (Teacher Consultant)

In the interview with the Lead Scientist, he described how the project involved him opening himself and his work up to scrutiny by his peers, which made accuracy even more important.

I'm opening myself potentially up to a lot more scrutiny than a normal researcher would do. And I'm quite hard-nosed, but still I would take it, yeah, a bit personally if we did something that was wrong or interpreted, you know, taught something that wasn't correct. So I worry about those sorts of things and I think you can get away with a lot in traditional research; peer review is one thing but nobody, even in peer review people don't have the data when they're looking at your research that you're publishing. And we're totally opening up from the start to the finish and the schools that are involved are going to be analysing the data as well, so there's a lot of people that are going to be looking at what we're doing. (Lead Scientist)

Uptake from teachers and schools

At the time of interviewing, 10-12 schools were regularly submitting data. More had completed the consent process but had yet to upload data. Considering that over 300 teachers registered an initial interest in the project at the end of the 2011 summer term, the team were disappointed with these numbers and were continuing to promote the project to schools.

The short timescale was seen as a factor contributing to the lower-than-expected uptake:

By the time we got the money, we got the ethics approval, we could talk to teachers and build the site it was October going on November and that just missed the cycle for teachers to say put this into your work schedules and that's been the major downer on the numbers of teachers actually participating in it. (Project Director)

There also seemed to be a perception from some schools that they had missed the opportunity to participate, but it is possible to join at any time and submit historic data.

We've noticed and sensed amongst some teachers that they feel that they've missed it, the project, regretfully missed it, they'd have liked to have taken part but because of their schedules they didn't find out in enough time. And so we've been desperately trying to tell them no you haven't, you know, we haven't had a flu outbreak this year, it's still worth taking part next term. So I'm hoping that many will come back refreshed next term. (Project Director)

This was the area where interviewees had the largest concerns for the project's success.

I am still really nervous about the number of schools that we'll get. (Lead Scientist)

The ways in which interviewees framed 'success' are described in the next Section.

What would 'success' look like?

For students, teachers and schools

Interviewees anticipated that the project would allow students to participate in and gain a deeper understanding of the scientific process. It was noted that the purpose of this was not to 'promote' science to young people, but to provide an authentic experience:

They're going to come away with a much, much deeper understanding of the scientific process and how science is conducted in the real world. Some people have suggested that might be a bad thing - they're realising actually how dull it can be, the fact that it takes six months rather than six seconds to get a result ... But I've always believed in honesty and transparency as the best way of getting a long term buy in to things and so trying to get away from the fact that science is detailed and involved I think would be counterproductive. (Project Director)

Several of the interviewees pointed out how DMD is different from other 'citizen science' projects that involve monitoring biodiversity or classifying galaxies.

I wanted them to be able to have some kind of a creative input, that they're generating data and that more importantly analysing the data and looking for patterns and things that scientists may not either see or have the time to be able to go in and look at that level of detail. (Teacher Consultant)

For teachers, the main goal of the project is to support them in teaching data analysis and scientific process.

Talking to teachers at a secondary school level, they consistently identify teaching about data as being a problem. (Project Director)

It was hoped that DMD would build teachers' confidence in dealing with real, messy data sets.

For teachers I think it will give them the confidence in using real data in the classroom, in being able to do work where it's not got a predictable outcome, about getting involved with scientists and collaborating with their work. (Teacher Consultant)

For science and scientists

From the scientific perspective, defining success was relatively simple. The goal was for enough schools to submit regular data to address the research question about whether school absence data is an effective indicator for flu outbreaks.

So if I was to define success for this project for the research side of things it will be getting a good level of data and schools joining the project and submitting their data and staying engaged with the project until March next year, and not necessarily the outbreak [investigation] stuff, but the core submitting their weekly data for the absences. (Lead Scientist)

This is discussed in greater detail in the Section on 'Thresholds for Success' later in the report.

For public engagement

Decipher My Data was seen as an innovative and important project for science engagement and online engagement. Unique aspects included the roles of students as citizen scientists (beyond data collection and classifying), and the monitoring and evaluation data that can be collected around the online engagement process.

One of the things that we've always said for Decipher my Data is that the students have got to have a proper role in this and they've got to be able to contribute scientifically to the process, not just collecting data, not just doing very, very basic analysis on it, but being able to add their knowledge, whether it's local knowledge or something else that they can look up and contribute to the process and that it's got to be educational for them. Now if we can pull that off I think that will be an incentive for others to follow. (Project Director)

From the point of view of the Lead Scientist, DMD is an opportunity for him to engage the project audience with epidemiology.

As I understand it, epidemiology is not on the curriculum and being able to give students a chance to learn about it through doing it as well, I think, is really, a really important thing ... I think there's a lot of bad press coverage of science and reporting. And I think one of the major ways to overcome that is to engage with students and give them the skills to be able to say, "This is how you look at data and how you analyse it. And you can tell for yourself whether that newspaper article that you've just read is crap or not." (Lead Scientist)

Future project development

The current plan is to run further DMD projects in different scientific areas. The Project Director and Teacher Consultant were keen for *Flu!* to be successful enough to attract the support and funding necessary to extend the project. Discussions with potential future funders were already underway at the time of interviewing.

If at the end of this project we've got nothing to look at in terms of the scientific outcome then it's going to be very difficult to sell it to teachers ongoing. But if we've got something that we can shout about in this project then that's something that we can build on. (Teacher Consultant)

Well there's no point doing it just for the one off. You know, we've just put far too much energy and time into the first project of its sort, far too much in order for them to not think about stage two. (Project Director)

'Success' depends on continuing the work to capitalise on the investment in the project infrastructure and the learning to date.

Thresholds for success

The threshold for success (the minimum outcome required for interviewees to feel that the work they had put in was worthwhile) was agreed to be enough schools submitting data for a research paper to be published. The Lead Scientist felt that twenty-five schools would meet this threshold.

If we didn't get at least sort of twenty-five schools I'd say, signed up and submitting data until March I'd be disappointed. (Lead Scientist)

All interviewees pointed out that there were several preconditions to meeting this goal, related to how accessible and engaging the project is for schools.

In some respects the minimum has already been achieved in the learning that we got from it, but that's a bit trite. I think if we found no teachers entering data or if we didn't hit at least 25 teachers having entered data by the end of March, I'd be very disappointed. Whether there's enough data or whether it shows that there's a relationship is irrelevant but if we've made it too complex, too difficult for teachers to actually participate in this and I'm using the collecting data as the main indicator on that. (Project Director)

Another precondition that the team have no control over is the timing of the next influenza outbreak:

I'm not going to be disappointed if there's not lots [of data uploaded] in the first week of January because it's exam time and I'm hoping that the flu outbreak could hold off until late February... (Project Director)

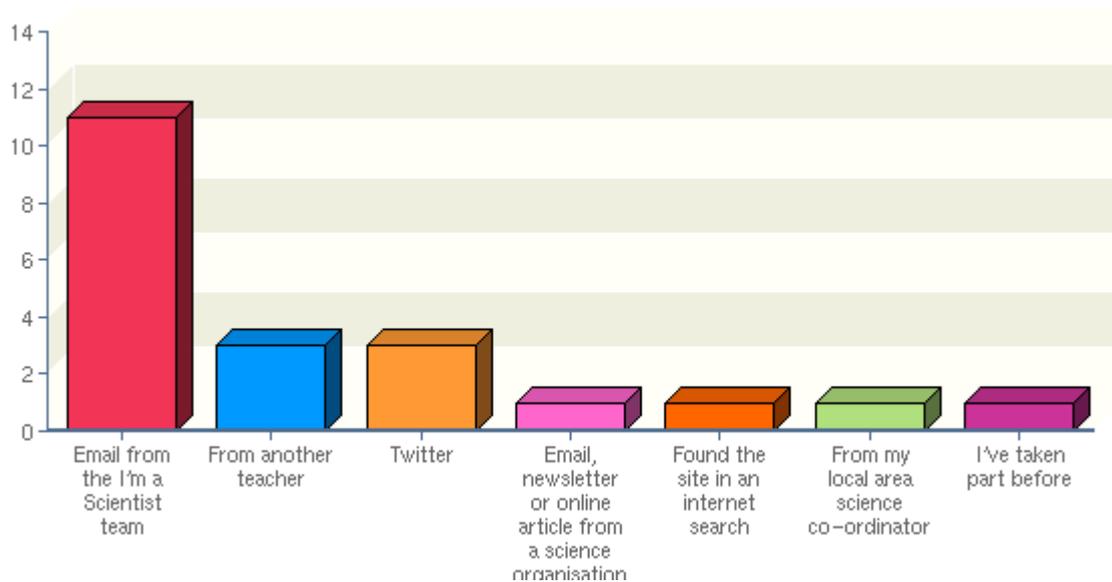
Conclusion

The interviews revealed that the core team members share a strong vision for *Decipher My Data* and are highly committed to the project. A balance between the project goals in the areas of science, education and public engagement has been effectively negotiated, although the time-consuming processing of gaining ethical approval was frustrating – especially given the short timescale to set up the project. Successes to date include great simplification of the data requested from schools and identifying tools to help them submit this information. Challenges are the lower-than-expected uptake at the time of interviewing and the perception from some schools that they have missed the opportunity to participate.

All interviewees said that the project would be successful if sufficient data were collected to publish the results of the study in a medical journal. They pointed out that effective engagement of schools was a precondition to this outcome. Another precondition outside the control of the project is that a flu outbreak takes place at the time when schools are collecting absence data. All of the team members had committed a great deal of time and energy to the project, and the work was very much ongoing at the time of interviewing. They felt that this effort would be worthwhile if the model were used in further scientific investigations, but that gaining support for this would be dependent on the success of *Flu!*

Appendix 3: Findings from pre-project survey with teachers

1. How did you hear about Decipher My Data? (tick all that apply)

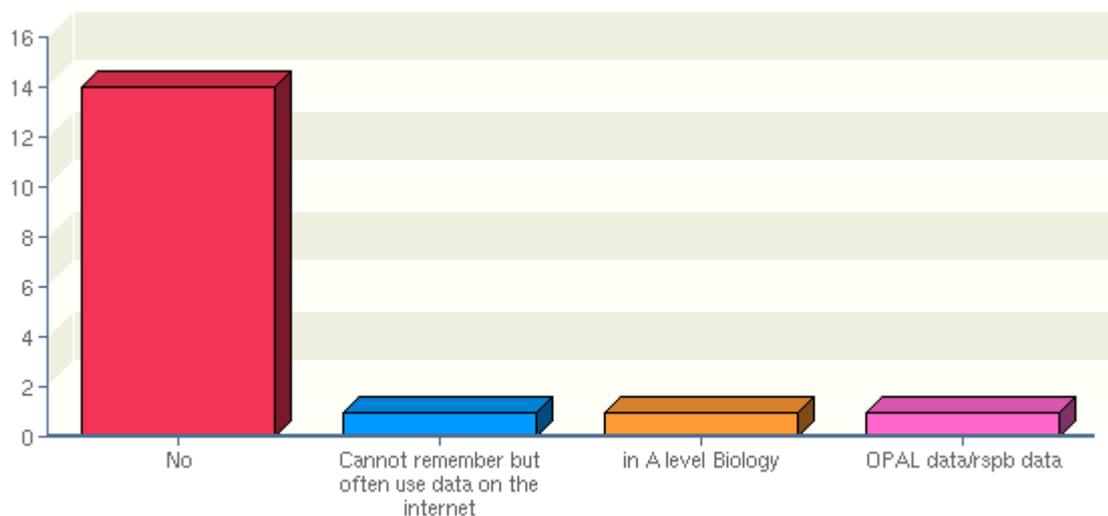


Item	Count	Percent %
Email from the I'm a Scientist team	11	61.11%
From another teacher	3	16.67%
Twitter	3	16.67%
Email, newsletter or online article from a science organisation	1	5.56%
Found the site in an internet search	1	5.56%
From my local area science co-ordinator	1	5.56%
I've taken part before	1	5.56%

2. Please rank the following outcomes in terms of importance for you as a teacher (the most important at the top to least important at the bottom).

Value	1	2	3	4	5	6	7	Average Rank
I will be more confident in using publicly available datasets in my teaching		1			5	12		6.6
Students have a better understanding of the scientific process	8	9	1					1.6
Students feel they can do real science	7	4	3	2	2			2.3
Students are more aware about flu and epidemiology	2	2	3	1	7	1	2	4.1
I will be more confident in teaching data analysis to students		1	2	2	3	7	3	5.2
Students are more aware about data reliability, complexity and confounding variables	1	1	4	6	3	2	1	4.1
Students feel more confident working on complex datasets		1	5	6	3	3		4.1

3. Have you used a publicly available dataset to help teach your students about data analysis before? If yes, tell us which.

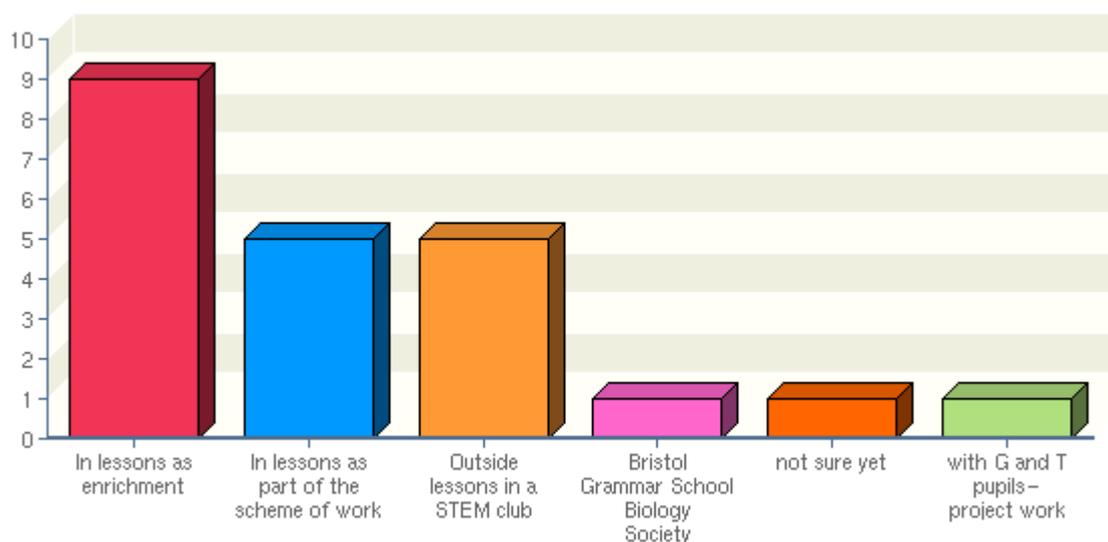


Item	Count	Percent %
No	14	82.35%
Cannot remember but often use data on the internet	1	5.88%
in A level Biology	1	5.88%
OPAL data/rspsb data	1	5.88%

4. If you answered yes to Question 5, to what extent do you agree with the following statements on using a publicly available dataset?

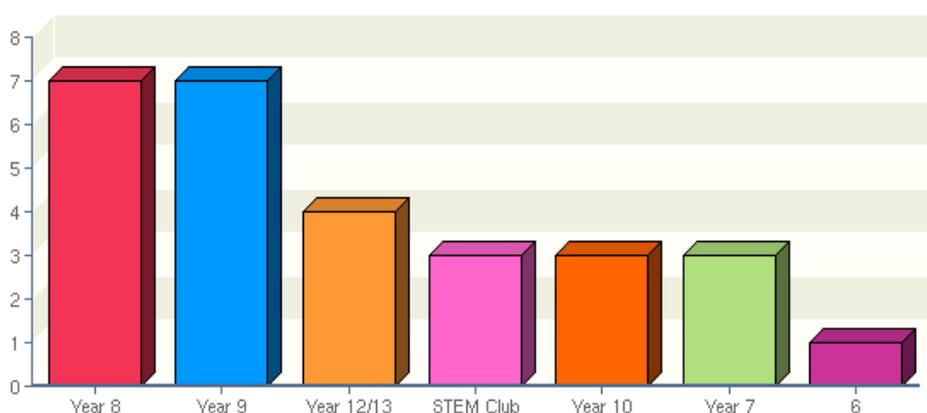
Item	Strongly agree	Agree	Disagree	Strongly disagree	Total
It was easy to extract the data I wanted from the dataset	40.0% 2	60.0% 3			5
It didn't take too much of my time to prepare for		75.0% 3	25.0% 1		4
I could do all the analysis I'd planned on the dataset		50.0% 2	50.0% 2		4
It helped my students learn about data analysis	25.0% 1	75.0% 3			4
My students enjoyed the exercise		100.0% 4			4
Overall I was satisfied with the experience of using the dataset		75.0% 3	25.0% 1		4
Average %	12.0%	72.0%	16.0%	0.0%	25.0

5. How are you planning to run this project?



Item	Count	Percent %
In lessons as enrichment	9	50.00%
In lessons as part of the scheme of work	5	27.78%
Outside lessons in a STEM club	5	27.78%
Bristol Grammar School Biology Society	1	5.56%
not sure yet	1	5.56%
with G and T pupils- project work	1	5.56%

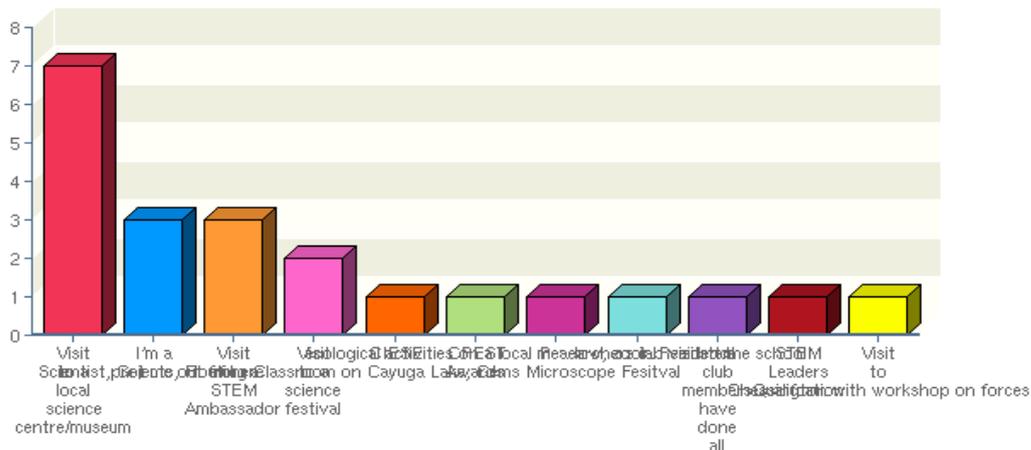
6. What year group of students are you planning to run this project with?



Item	Count	Percent %
Year 8	7	38.89%
Year 9	7	38.89%
Year 12/13	4	22.22%
STEM Club	3	16.67%
Year 10	3	16.67%
Year 7	3	16.67%
6	1	5.56%

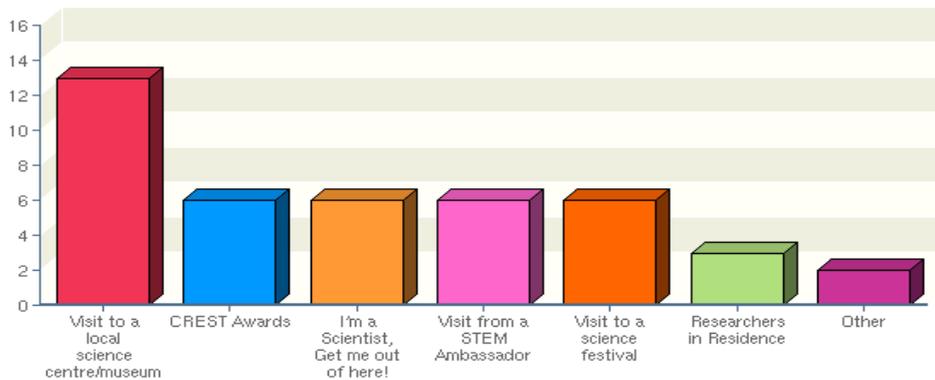
Average: 0.33

7. Have the class you're running Decipher My Data with taken part in any of the following science enrichment projects?



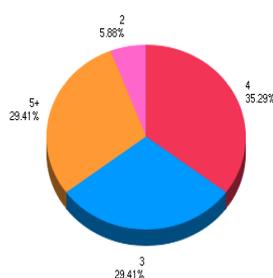
Item	Count	Percent %
Visit to a local science centre/museum	7	63.64%
I'm a Scientist, Get me out of here!	3	27.27%
Visit from a STEM Ambassador	3	27.27%
Visit to a science festival	2	18.18%
CIESE projects, Floating Classroom on Cayuga Lake, Gems Microscope Festival	1	9.09%
CREST Awards	1	9.09%
ecological activities on a local meadow, zoolab visited the school	1	9.09%
Researchers in Residence	1	9.09%
stem club members have done all above	1	9.09%
STEM Leaders Qualification	1	9.09%
Visit to Chessington with workshop on forces	1	9.09%

8. Have you taken part in any of the following science enrichment projects?



Item	Count	Percent %
Visit to a local science centre/museum	13	81.25%
CREST Awards	6	37.50%
I'm a Scientist, Get me out of here!	6	37.50%
Visit from a STEM Ambassador	6	37.50%
Visit to a science festival	6	37.50%
Researchers in Residence	3	18.75%
cafe scientifique, chicken run enterprise	1	6.25%
see above	1	6.25%

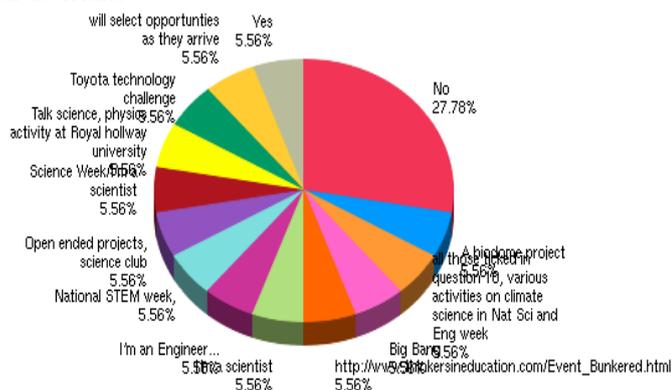
9. How many lessons do you feel it is worth spending on this project?



Item	Count	Percent %
4	6	35.29%
3	5	29.41%
5+	5	29.41%
2	1	5.88%

Average: 2.41

10. Are you planning on also running other major science enrichment activities over the next few months? If yes, tell us what.



Item	Count	Percent %
No	5	27.78%
A biodome project	1	5.56%
all those ticked in question 10, various activities on climate science in Nat Sci and Eng week	1	5.56%
Big Bang	1	5.56%
http://www.thinkersineducation.com/Event_Bunkered.html	1	5.56%
I'm a scientist	1	5.56%
I'm an Engineer...	1	5.56%
National STEM week,	1	5.56%
Open ended projects, science club	1	5.56%
Science Week/I'm a scientist	1	5.56%
Talk science, physics activity at Royal hollway university	1	5.56%
Toyota technology challenge	1	5.56%
will select opportunities as they arrive	1	5.56%
Yes	1	5.56%

What appeals to you most about Decipher My Data?

Open Text Responses:
Real world examples and contributions.
using real data and being about of someone's research
Pupils are doing it and they feel part of a big important project
It is something outside of the curriculum which I can adapt for my top achieving Biologists at A-level, especially as they have to study Health and Disease in the specification.
The ability to use data in a scientific fashion to stress how science works principles
Opportunity to give students the opportunity to handle real data.
The students participate in a live scientific investigation that could have real impact on their lives.
real investigation, real data
Being able to get pupils involved in a piece of real science research so they can see what science is really all about.
Real data, real science
The chance for the subject ambassadors in year 12 to run a project for lower school students.
Citizen science is always appealing to me because science impacts everything we do! I like the increase of sample size---it shows increasing accuracy as sample size increases. This is also a great task to help kids understand the nature of science.
Doing something interactive that will be relevant to my pupils
Using real data
The idea of contributing to genuine research
It seems like a project that the students will get excited about and can be taught about peer review etc in a interesting and relevant way.
students being involved in real science
The chance for my students to be involved in a real science research project, rather than one where the answer's already known.
being part of a large project and use of real data students have contributed to in my lessons

Is there anything else not mentioned in Question 3 that you're expecting as an important outcome?

Open Text Responses:
Enjoyment and ownership. I will be handing all of this to three students to run and then I will simply oversee it.
No
No
Nature of science!

Appendix 4: Credits

The project was made possible by the following people:

Declan Fleming – Teaching Consultant. The original concept came from Declan. He developed the teaching materials, the films with Rob Aldridge, a teacher user of the site and with colleagues has given very useful feedback. He has been a major driver of the project and cheerleader in chief for promoting it to the teaching community.

@declanfleming | <http://declanfleming.com/>

Rob Aldridge – Lead scientist. Rob has developed the science side of this project. He has tirelessly helped develop the project whilst getting married and moving house. He drove through the ethics application and patiently created films and written material on flu and epidemiology. He responded to students' questions and relentlessly wrote blog post to keep the students engaged.

@rob_aldrige | http://www.ucl.ac.uk/slms/aco/acf/profiles/rob_aldrige

Katie Tomlinson – Project Wrangler. Katie's job was to liaise with teachers and the rest of the project team to keep everything in order. Her enthusiasm and positivity kept us going without flu.

Mike Little – Lead Developer. Mike's job was to take an ambitious website specification and turn it into reality on a very small budget. Yet again we pushed our CMS of choice, Wordpress, to do something new.

@mikelittlezed1 | <http://zed1.com/about/about-mike-little>

Steve Potts – Developer. Steve was responsible for integrating Google Charts into our site. His work sits at the centre of the project. The graphs translate the data into something that the students can analyse.

@freeballoon

Andrew Beeken – Developer. Andrew took our graphic designs and requirements and turned them into CSS stylesheets. He made the site look right.

@abeeken

Gareth Coxon – Designer. Gareth designed the overall look and feel for the project.

@garethdotdesign

Laura Grant – Evaluator. Laura has been an excellent and helpful evaluator. Her interviews with the senior project team were useful reflections and the work on evaluating teacher opinions reported in this document are insightful.

@laura_grant

Shane McCracken – Project Director. Shane articulated the vision for the project and helped all the project members do their jobs.

@shanemcc