London Schools Excellence Fund

Self-Evaluation Toolkit

Final report

Contact Details

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Evaluation Final Report Template

Introduction

The London Schools Excellence Fund (LSEF) is based on the hypothesis that investing in teaching, subject knowledge and subject-specific teaching methods and pedagogy will lead to improved outcomes for pupils in terms of attainment, subject participation and aspiration. The GLA is supporting London schools to continue to be the best in the country, with the best teachers and securing the best results for young Londoners. The evaluation will gather information on the impact of the Fund on teachers, students and the wider system.

This report is designed for you to demonstrate the impact of your project on teachers, pupils and the wider school system and reflect on lessons learnt. It allows you to highlight the strengths and weaknesses of your project methodology and could be used to secure future funding to sustain the project from other sources. All final reports will feed into the programme wide meta-evaluation of the LSEF being undertaken by SQW. Please read in conjunction with Project Oracle's **'Guidance to completing the Evaluation Final Report'**.

Project Oracle: Level 2
Report Submission Deadline: ~~English for Integration - 9 June 2015 /~~ Round 1 and Round 2 - 30 September 2015 *(delete as appropriate)*
Report Submission: Final Report to the GLA ~~/ Rocket Science~~ *(delete as appropriate)*

Project Name: Digital Schoolhouse
Lead Delivery Organisation: Ukie
London Schools Excellence Fund Reference:
Author of the Self-Evaluation: Shahneila Saeed, Research Base
Total LSEF grant funding for project: £450,000
Total Lifetime cost of the project (inc. match funding): £450,000
Actual Project Start Date: October 2013
Actual Project End Date: December 2015

1. Executive Summary

This should be a brief summary of what information is included in the report, the evaluation methods and analysis used and a summary of the key findings from your project evaluation. (maximum 500 words)

Excellent progress was made in establishing the Digital Schoolhouse network across London fulfilling the aim of linking primary, secondary and university with games and technology industry innovators.

- 5,576 primary school pupils participated
- approximately 600 teachers were supported
- 192 workshops were delivered using legacy and new materials mapped to the new curriculum, CAS progression pathways and the computational thinking framework.

Digital Schoolhouse lead (secondary) teachers have been trained in computational thinking, subject knowledge and pedagogy in collaboration with Queen Mary University of London and Kings College, London. Each teacher then delivered a series of workshops to visiting primary school pupils, thereby establishing a network of hubs to support teachers and pupils with the new computing curriculum. The initial model called for Digital Schoolhouses to deliver 10 CPD events throughout the year. However, the model was adapted in the light of experience and Digital Schoolhouse teachers began to deliver CPD using a more personalised approach. Results show that this innovative, personalised and sustained approach to delivering CPD has helped to motivate teachers and embed computing within the schools.

Partnerships have been established with a number of leading organisations. These include leading games industry partners such as Disney, Kuato Studios, Playniac, Code Kingdoms and Video Games Ambassadors to use games products to explain computing concepts in new ways. Specific work with edu-tech firms such as 3Doodler, Apps for Good, Cannybots and Tech Will Save Us is allowing the development of new technologies and methodologies within education, such as: using embedding 3D technologies; using Arduino's and Raspberry Pi's; and exploring cross collaboration between them. Other key partnerships have included extensive work with: Queen Mary University of London (CS4FN), Kings College London, Roehampton University, Computing At School, Progression Pathways, BBC, Women in Games Jobs, Intel, Albion, Aspiration Academies, Pearson, Barefoot Computing and many more currently underway.

Teacher outcomes

For the secondary teachers delivering the project benefits include:

- improved knowledge and understanding of the new curriculum and pedagogical approaches; increased confidence levels in delivery of the new curriculum
- ability to use and embed resources and materials with secondary school students.

Primary school teachers have also reported increased understanding of the new computing curriculum and awareness of resources. Teachers also report that workshops help them embed computing concepts in a way that avoid being "dry and one-dimensional".

Pupil outcomes

The findings show that participation in the DSH helps improve pupil confidence, knowledge and understanding, engagement, motivation and enthusiasm with computing. There was no significant gender gap within these results: boys and girls make similar progress in educational attainment and are equally engaged, and motivated. Secondary school leaders also reported that the programme was seen to help "encourage girls into computing", inspiring an interest in programming amongst girls.

Pupils and primary teachers report that the workshops foster collaborative working and encourages the pupils to share their learning beyond the DSH day. Pupils "…can be ambassadors for others" and demonstrate what they have learnt with younger siblings. Several pupils after the workshop also reported that they were now inspired to consider a career in the field of computing.

School outcomes
The Digital Schoolhouse is "an invaluable hub for new technology" according to one primary teacher. For primary schools some of the largest benefits are the ability for pupils to immerse themselves in a secondary school environment and to use resources that they would not otherwise have the opportunity to experience. Secondary schools appreciate the improved understanding they have of their Key Stage 2 intake, as well as benefit from the raised profile that participating in the project brings.

Moving forward
The project will continue for another academic year. We currently have seven Digital Schoolhouses for the academic year 2015/2016. These include four of the existing schools, now moving into Year 2 and 3 new schools. The second year of the project aims to begin to look at the long term impacts of the project on the schools and pupils involved. This year will also see the project begin to investigate appropriate avenues to become self-sustaining as well as beginning the expansion of the project into 12 new regions around the country.

2. Project Description

Much of the detail for this section can be drawn from your Stage 2 funding application. Please note that if you do copy this information from your original application, funding agreement, or interim report, be sure to update it as appropriate (e.g. including tense change).

Provide a full project description (approximately one side of A4), in particular:

- *Why was the project set up? / What need was it seeking to address? (e.g. because teachers lacked confidence in their subject knowledge? Because pupil attainment was lower in this subject area in this borough/cluster/school/than in other boroughs/clusters/schools?).*
- *What were the circumstances into which it was introduced (e.g. existing networks of schools/ expert partner offering a new approach etc.)?*
- *What project activities have been put in place?*
- *Where has the project been delivered geographically?*
- *Who delivered the project?*
- *Who were the target beneficiary groups of the project and why?*

Due to shortages of skilled teachers in this field, London needs a holistic approach to Computer Science CPD in order to scale Computer Science adequately. The Digital Schoolhouse sought to ensure that London schools led the way developing Computer Science education; focusing in particular on years 5 to 7, taking advantage of significant changes in the curriculum and develop teacher training.

Delivered by the video games trade body UK Interactive Entertainment Association (Ukie), the model aimed to operate in 10 schools, becoming a transition project established to offer predominantly pupils from Years 5 and 6 from local primary schools with the opportunity to visit a school for a day of free specialist teaching in a dedicated ("Schoolhouse") Computing environment. Computer Science concepts are taught wherever possible without the use of computers and related to pupils existing 'real world' understanding and the fusion of art and science ('STEAM') e.g. through dance, art, mathematics or literacy.

The key activities and benefits include:

- Initial teacher training and up-skilling and retraining experienced teachers in Computer Science through a peer-to-peer approach and developing new relationships between schools and King's College London and Queen Mary's to train DSH teachers with CPD.
- Increasing demand and take-up of Computer Science and Computing from KS1-KS4
- Increasing the number of STEMNET and Ambassadors from the VFX, games, animation and film industries actively engaged in schools
- Up-skilling and retraining experienced teachers through peer-to-peer approaches
- Developing better transition links between primary and secondary education
- Improved and increased 'marketing' of the participating secondary school to a wider audience of primary schools, thereby, potentially increasing the number of applications received for the next Year 7 intake.

Lesson materials and associated resources to ensure progression were developed to support teachers (both those within the project as well as a wider national reach). Inspiration and support for these materials came from a range of innovative resources including Queen Mary University of London's Computer Science For Fun (CS4FN) project.

The 10 secondary schools recruited to be Digital Schoolhouses were:

- Acland Burghley School (joined in May 2015)
- Acton High School
- Highgate Wood School
- Holloway School
- Preston Manor School
- La Sainte Union Catholic School (dropped out in November 2014)
- Regents Park School/Camden CLC
- Richmond Park Academy
- Townley Grammar
- Woodford County High School

The project has continued into a second academic year. The following schools are participating in the project for the year 2015/2016:

- Burntwood School (new, teacher moved from Acland Burghley)
- Dover College, Kent (new)
- Highgate Wood School
- Mount Carmel School (new)
- Regent Park School/Camden CLC
- Townley Grammar
- Woodford County High School

Each school has nominated one lead teacher, although in some schools additional members of the department are assisting with the delivery of the project.

Additionally the project seeks to work with the creative industries to establish meaningful links with the Digital Schoolhouse and their input into developing resources/enrichment opportunities for the new computing curriculum. Collaborations currently include: Police Intellectual Property Crime Unit, Nintendo, Playstation, Disney, Warner Bros, Tech Will Save Us, 3Doodler, Code Kingdoms, Intel, Gamewagon, Apps for Good & Draw and Race.

2.1 Does your project support transition to the new national curriculum? Yes/~~No~~

If **Yes**, what does it address? The new Computing Programmes of Study

2.2 Please list any materials produced and/or web links and state where the materials can be found. Projects should promote and share resources and include them on the LondonEd website.

All resources produced can be found on:

- Project site: www.digitalschoolhouse.org.uk
- Videos (UkieTV Digital Schoolhouse YouTube Playlist): http://bit.ly/1FI69sF
- TES Resources (over 3000 downloads since April 2015): https://www.tes.com/teaching-resources/search/?q=digital+schoolhouse
- National STEM Centre: http://www.nationalstemcentre.org.uk/elibrary/collection/2099/digital-schoolhouse
- 3Doodler Site: http://the3doodler.com/curriculum/#computational-thinking and in featured http://3o5blc1g4dkb1koq0fnnpq5z.wpengine.netdna-cdn.com/wp-content/uploads/2015/07/Spotlight-Shahneila-Saeed.pdf
- QuickStart Computing: http://www.quickstartcomputing.org/
- Progression Pathways: http://www.progression-pathways.co.uk/
- Code Kingdoms: http://codekingdoms.com/resources/

3. Theory of Change and Evaluation Methodology

Please attach a copy of your validated Theory of Change and Evaluation Framework.

Throughout the report it would be useful if you make reference to these documents. Where appropriate we would also encourage you to include any assumptions you have made from previous research.

3.1 Please list **all** outcomes from your evaluation framework in Table 1. If you have made any changes to your intended outcomes after your Theory of Change was validated please include revised outcomes and the reason for change.

Table 1- Outcomes

Description	Original Target Outcomes	Revised Target Outcomes	Reason for change
Teacher Outcome 1	Increased subject knowledge and greater awareness of subject specific teaching methods in new Computing Programme od Study such as algorithms, programming, hardware and networking and digital literacy.		
Teacher Outcome 2	Increased teacher confidence for all DSH teachers and participating primary school teachers		
Teacher Outcome 3	Delivery of higher quality teaching including subject-focused and teaching methods		
Pupil outcome 1	Increased educational attainment and progress in Computing.		
Wider system outcome 1	Teachers/ schools **involved in intervention** making greater use of networks, other schools and colleagues to improve subject knowledge and teaching practice		

3.2 Did you make any changes to your project's activities after your Theory of Change was validated? ~~Yes~~/No

If **Yes**, what were these changes (e.g. took on additional activities?)

3.3 Did you change your curriculum subject/s focus or key stage? ~~Yes/~~No

If **Yes**, please explain what changes you made, why, and provide some commentary on how they affected delivery.

3.4 Did you evaluate your project in the way you had originally planned to, as reflected in your validated evaluation plan?
Consider changes to evaluation tools/methods, sample sizes, and anticipated outcomes. If applicable, please explain what changes you made and why, and provide some commentary on how they affected your evaluation.

4. Evaluation Methodological Limitations

4.1 What are the main methodological limitations, if any, of your evaluation?

This can include data limitations or difficulty in identifying a comparison group. In order to get a realistic idea of the strength of your evaluation, and identify possible improvements, it is essential that you reflect on the strengths and weaknesses of your evaluation.
You should address limitations of the evaluation only, not the project itself - *Every evaluation has limitations, so please be honest. This could include limitations relating to:*

- *The kinds of data you could/ could not collect (and the response rate for surveys)*
- *The size of the sample/ group you are evaluating*
- *The extent to which you felt able to assess the impact of activity on beneficiaries (what changes in attitudes/behaviours/attainment were caused by the intervention and what has been caused by other factors)*
- *Also include mitigating actions for methodological limitations where possible* **–** *e.g. alternative approaches or solutions and also how these limitations will affect the evaluation of the project (particularly pupil and teachers outcomes).*

4.2 Are you planning to continue with the project, once this round of funding finishes?
Yes/~~No~~

If **yes**, will you (and how will you) evaluate impact going forward?

There are two principal limitations of this evaluation. The first relates to the fact that external evaluators changed over time and were not available consistently throughout the project. This meant that both that the evaluation design and data collection practices changed over time, and that external advice and support was not always available to the project team.

The second is that there were limited responses to evaluation surveys and qualitative feedback forms, with the exception of Digital Schoolhouse teacher feedback. In some instances, surveys and forms were not administered at all; Digital Schoolhouse teachers were asked to administer these feedback mechanisms and sometimes failed to do this. The absence, in particular, of a baseline survey for primary teachers means that there is no clear quantitative measure of change relating to primary school teachers' knowledge, understanding and confidence. Evidence regarding primary teachers has therefore been drawn from qualitative evidence from some of the teachers themselves (feedback form numbers were again very low) and the Digital Schoolhouse lesson observers.

Other limitations are as follows:

- Low respondent numbers mean that the samples for primary school teachers and pupils are not necessarily representative. There is a risk of false positives in reporting due to lack of independence in data collection. In some instances, teachers and pupils were handed feedback forms in person. This may have put respondents under pressure to emphasise the positive elements of the programme. In some cases, however, this risk will have been mitigated by providing respondents with anonymity.
- Feedback forms used for the evaluation had multiple purposes: as well as serving as a source for qualitative evidence, one form appears to have been used to gather marketing material for the course. As such, it contains some leading questions. These questions have been excluded from the analysis, but there is a risk that answering leading questions primes participants towards offering positive answers. We have noted where this may be the case in the analysis.
- Some children may have misunderstood the survey questions. One teacher wrote on a

feedback form that the survey was challenging for pupils to complete since certain technical terms were too difficult for them to understand.

- Seven of the 11 lesson observation forms have been analysed; one form was illegible the lesson observation forms were missing for three schools. Some other answers on hand-written feedback forms had to be excluded from the qualitative analysis due to illegible handwriting; the number of illegible answers have been included in footnotes where appropriate.

- A further limitation to the study is the low number of respondents to the survey for secondary teachers. While the number of survey respondents was close to the number of secondary teachers involved in the programme, the sample was too small for statistical tests to be included. Evidence from this survey should be interpreted with caution, as the small sample may have distorted findings.

5. Project Costs and Funding

5.1 Please fill in Table 2 and Table 3 below:

Table 2 - Project Income

	Original Budget	Additional Funding	Revised Budget [Original + any Additional Funding]	Actual Spend	Variance [Revised budget – Actual]
Total LSEF Funding	450000	--	--	**340681.78**	108741
Other Public Funding	--	--	--		
Other Private Funding	--	--	--		
In-kind support (e.g. by schools)	--	--	--		
Total Project Funding	45000	--	£449, 423		

List details in-kind support below and estimate value.

Table 3 - Project Expenditure

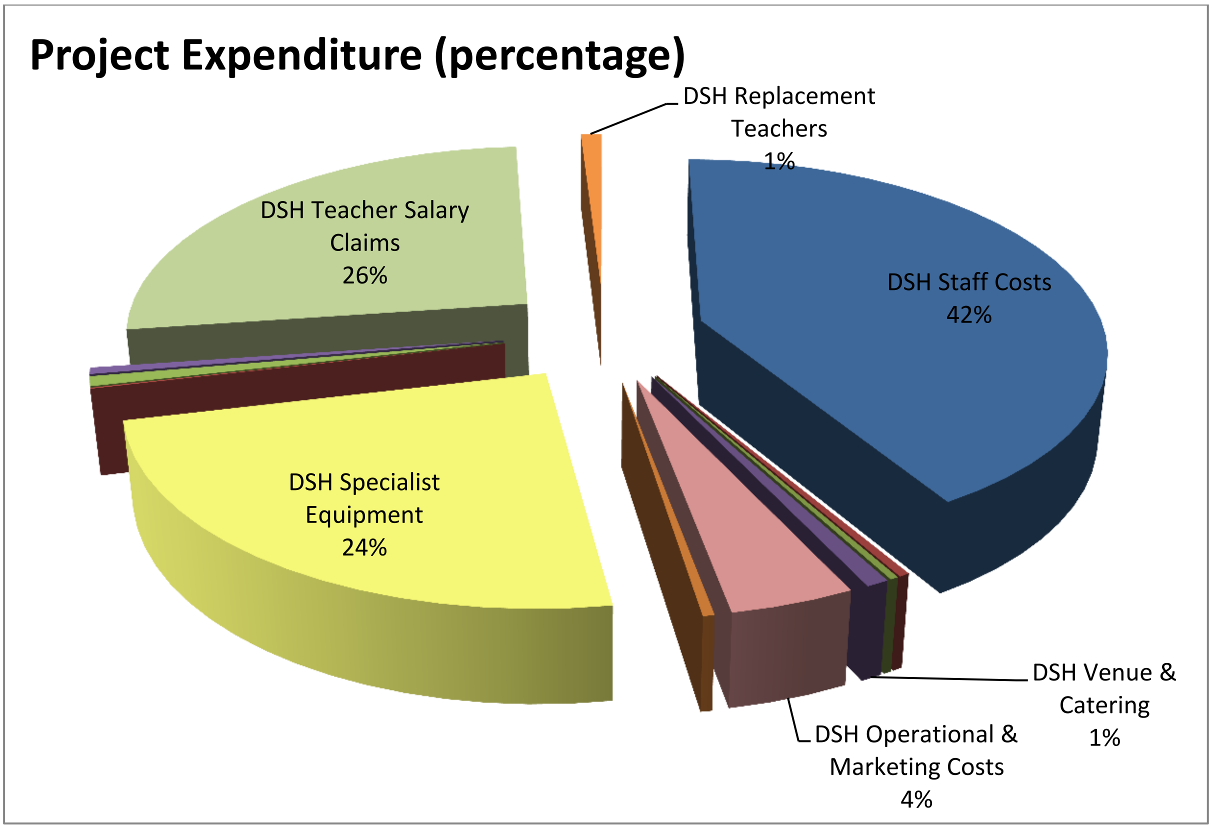
	Original Budget	Additional Funding	Revised Budget [Original + any Additional Funding]	Actual Spend	Variance [Revised budget – Actual]
1. Direct Staff Costs (Teachers & Project Manager)	£235, 173	--	--	£164497	£70676
2. Direct delivery costs e.g. consultants/HE (specify)	£8400			6200	£2200
3. Management and Administration Costs	£67, 500			£66611	£889
4. Training Costs	£2,000			0	£2000
5. Participant Costs (e.g. Expenses for travelling to venues, etc.)	£3000			£858	£2142
6. Publicity and Marketing Costs	£3350			13371	-£10021
7. Teacher Supply / Cover Costs	£19,000			£5802	£13198
8. Other Participant Costs	£8000			1784	£6216
9. Evaluation Costs	£20,000			£2, 688	£17312
10. Others as	£83,000			£78,	£4129

Required – Specialised equipment as approved by DSH				871	
Total Costs	£449, 423		£449, 423	340682	£108741

5.2 Please provide a commentary on Project Expenditure
This section should include:

- *commentary on the spend profile*
- *budget changes that have occurred, including the rationale for any changes*

(Maximum 300 words)



Spend Profile
The highest proportion of expenditure was staffing the project to enable it to be delivered. Ukie staffing costs, including the project lead amounts to 49% of total spending, and teacher salary costs 26%. However, if Ukie core costs are extracted from the total expenditure then the amount of money spent on teacher's salary contributions increases to 45% of the budget.

24% of the budget was spent on purchasing specialist equipment such as iPads, 3Doodler pens, Raspberry Pi's and other physical computing devices. This enabled us to develop creative and innovative new curriculum materials that supported teachers with their growing concern around delivering and using physical computing devices within the classroom.

We spent a lot more money than anticipated on publicity and marketing. The majority of these expenses were through using funds to develop the LEP Computing Guide for Senior Leaders (www.computingguide.org); a series of professionally created videos available on Ukie TV

YouTube channel describing and marketing the Digital Schoolhouse; a PR consultant; the Digital Schoolhouse website and branding.

Despite these expenses we do have an underspend; these funds will now be used to further the sustainability agenda and continue the delivery of the project till December 2015 and beyond.

Rationale for Budget Changes

1. There is a significant underspend on Direct Staff costs because we only had 8 schools (9th joined towards the end in May 2015) rather than the original 10 budgeted. In addition some schools that participated did not execute as many workshops as anticipated, this resulted in a lower claim. Another factor to take into account is that 50% of the schools operated on only a single day a week rather than the original 2 day a week model proposed in the bid.
2. Balance of budget will be used Sept to December to maintain the project for those schools continuing with us.
3. There is a small underspend for 'Direct Delivery' costs as we are awaiting an invoice for consultancy on project May to August which will utilise remainder of budget
4. Management & Administration as per project budget
5. Training costs – budget was not required as the Project Manager already had relevant experience
6. Travel costs – lower than budget as they are difficult to predict
7. Publicity & Marketing spend was higher than budget and as approved by GLA – the bulk of the costs were for developing the websites to publicise and promote as well as the development of a series of professionally developed Digital Schoolhouse videos.
8. Teacher supply costs – supply teachers were not required to the extent that was budgeted for.
9. Other participant costs – school costs for workshops was not as high as expected
10. Evaluation costs – awaiting final evaluation bill – will utilise approximately £8500 of remaining budget Sept to Dec
11. Specialised equipment – with approval of GLA UKIE focused on hardware which would enhance workshops and teaching – full benefit of equipment purchased August will be in Sept to Dec.

6. Project Outputs

Please use the following table to report against agreed output indicators, these should be the same outputs that were agreed in schedule 3 of your Funding Agreement and those that were outlined in your evaluation framework.

Table 4 – Outputs

Description	Original Target Outputs	Revised Target Outputs *[Original + any Additional Funding/GLA agreed reduction]*	Actual Outputs	Variance [Revised Target - Actual]
No. of DSH (secondary) schools	10		9	-1
No. of DSH (secondary) teachers	10		9	-1
No. of Primary teachers	None stated		466 (up to 661)	
No. of Primary schools	None stated		71	

No. of pupils	None stated		5576	

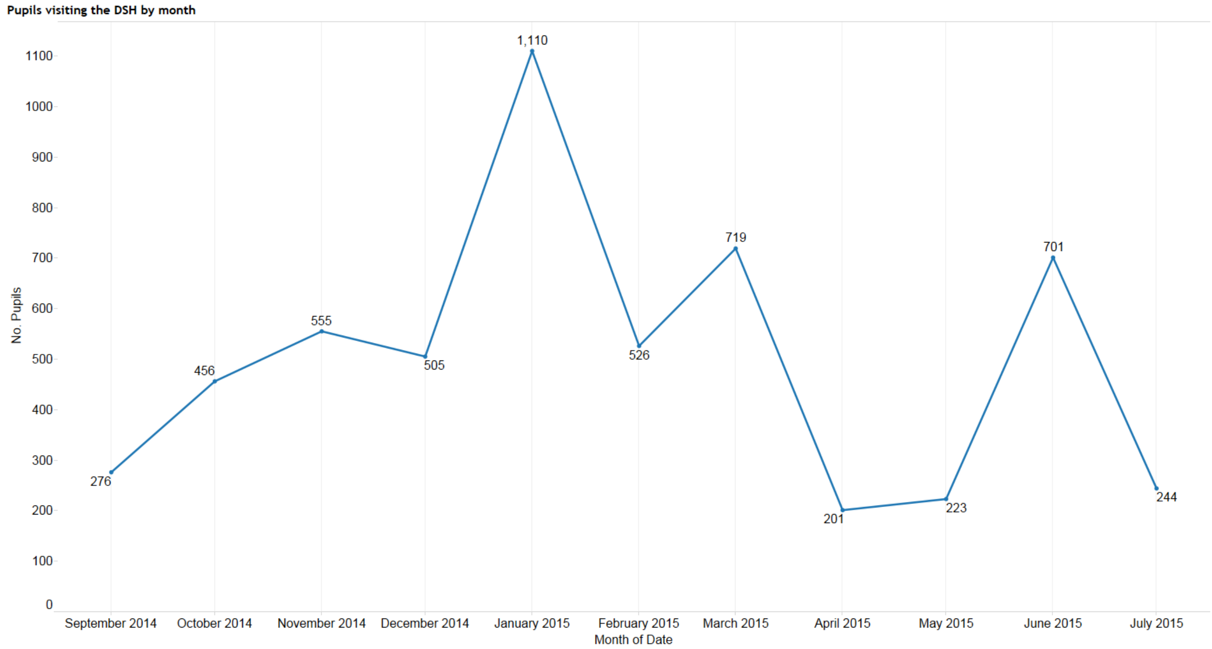


Figure 1 - Pupils visitng the DSH by month

Figure 1 enables us to see the trend of workshop activity over the course of the academic year. The notable points on this are the peaks in January and June where the most activity was recorded. From the secondary schools perspective these months fit into school calendar activity as periods where they are able to focus more on the project they are delivering. The lowest points are in April and May; 1) primary schools focusing on Year 6 SATS and, 2) secondary schools focusing on final preparations for exam students.

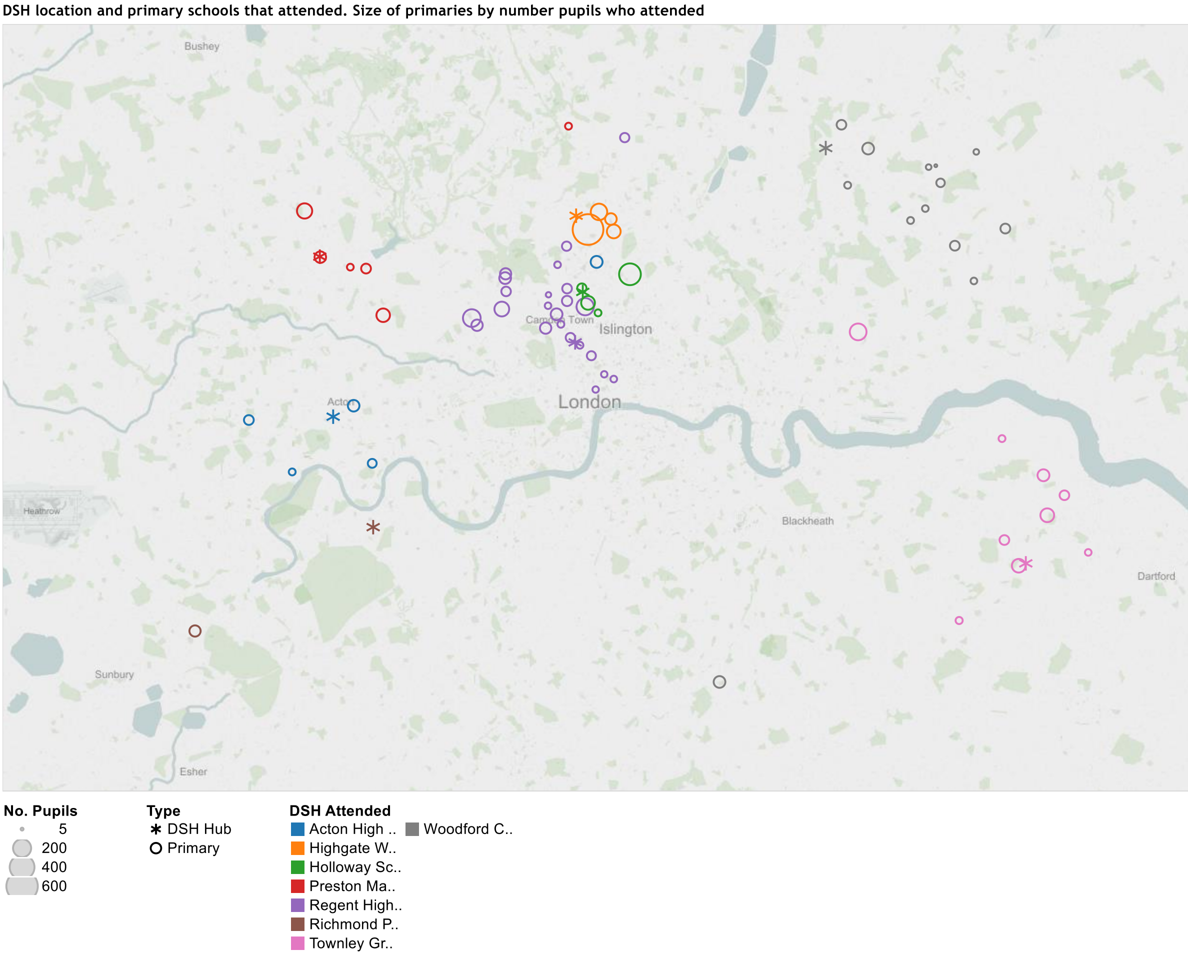


Figure 2 - DSH Location & Primary Schools attended

The above bubble chart is overlayed onto a geographical map of London which enables us to see the reach of the DSH networks. Digital Schoolhouses are identified by the asterisk symbol and the primary schools by a bubble. The size of the bubble denotes the number of pupils from that primary which were sent to a digital schoolhouse. For some primary schools this number is quite small as only one or two clases visited. However, for most the size of the bubble represents the fact that primary schools decided to send all their Year 5 and 6 classes with several requesting workshops for Year 3 and 4 as well.

The spread of the bubbles over the region shows that we have significant coverage over North and Eastern London areas, with large gaps in Southern and Western parts of London. These reflect the positions of the Digital Schoolhouses and supports the theory that primary schools will only attend a Digital Schoolhouse if its within reasonable travel distance. The chart allows us to see which areas of London should be targeted for new Digital Schoolhouses when the project expands.

Pupils by DSH

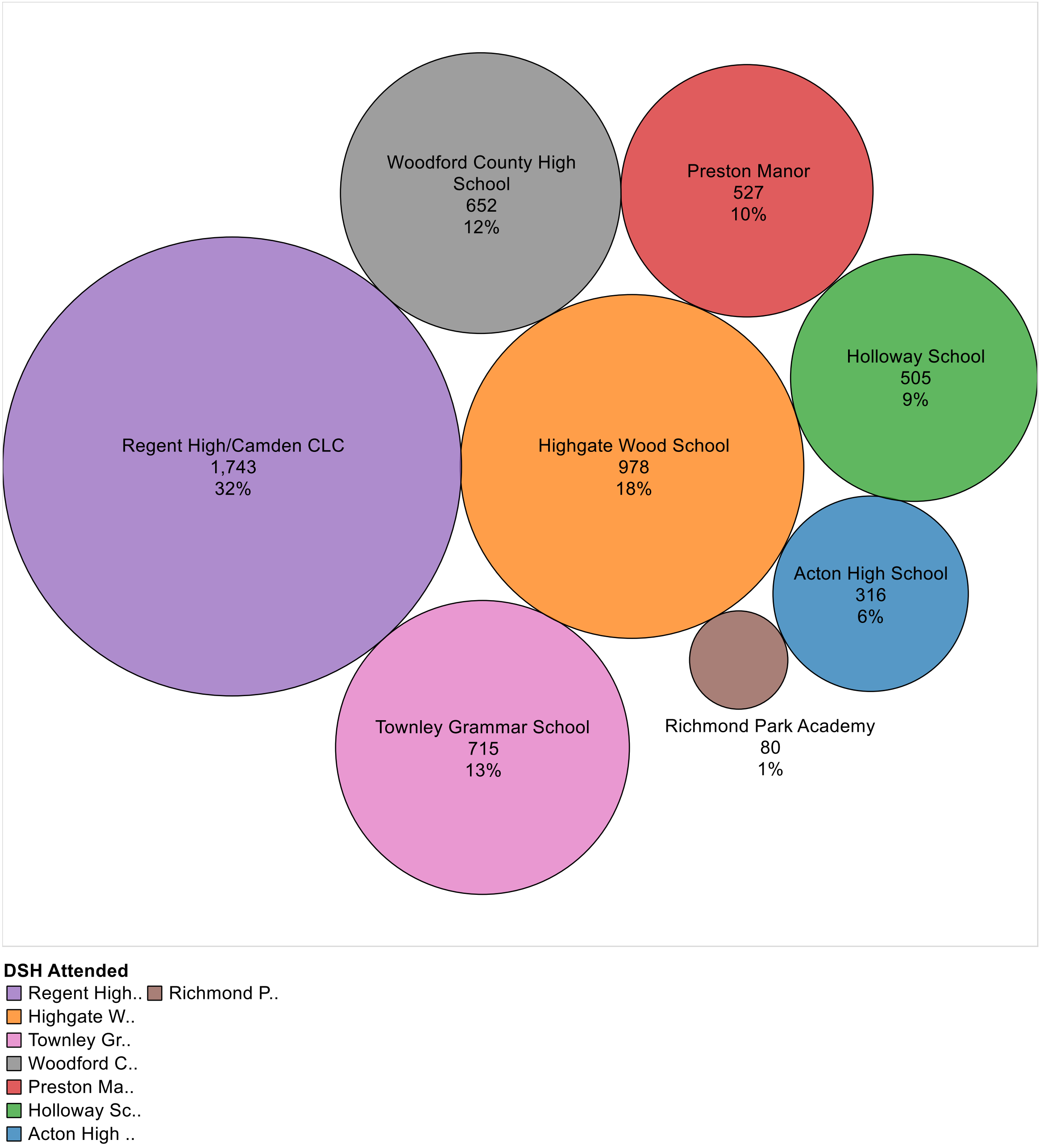


Figure 3 - Number of pupils supported per Digital Schoolhouse

Figure 3 highlights the amount of pupils that each Digital Schoolhouse supported over the course of the academic year. While Regent High made up the highest contribution with 32% of all pupils supported; it is important to remember that their workshops were delivered through Camden CLC. The CLC is attached to the school, but is operated by dedicated staff. They were therefore able to run the programme on a full 5 days a week if necessary, and had much greater flexibility to cater to primary school requirements.

Woodford County High School, Highgate Wood School and Townley Grammar are the next largest contributors to the outputs of the programme, supporting 43% of the pupils between them. All three schools are continuing to deliver the programme for a second year.

The smallest contributors did not manage to deliver workshops consistently throughout the year, there were large periods of time where they struggled to deliver any at all. In particular to note is Richmond Park Academy which failed to deliver a single workshop between September to March. After extensive work with this DSH the programme was adapted at the school, and connections were established with a local Special Needs school. Richmond Park Academy then delivered a series of workshops in the summer term to pupils within a single school.

Richmond Park Academy, Holloway School, Acton High School and Preston Manor will not be continuing with the Digital Schoolhouse project for the 2015/2016 academic year. Reasons cited by the schools are around school budgets and staffing deficits.

Acland Burghley School became our 9th Digital Schoolhouse and supported 60 students in July 2015 with their pilot workshops. Due to the delay in this school joining the programme their data is not included in the above analysis. While Acland Burghley will no longer continue with the Digital Schoolhouse project, the lead teacher from there has moved to Burntwood School, Wandsworth and will be continuing to deliver the programme from this new location. Bringing Burntwood School on board for the 2015/2016 academic year helps us plug the South West London gap in the Digital Schoolhouse coverage.

7. Key Beneficiary Data

Please use this section to provide a breakdown of teacher and pupil sub-groups involved in your project.

Data must be provided at project level. However, if you wish to disaggregate data by school then please add additional rows to the tables below. Please also confirm at what point this data was collected.

Please add columns to the tables if necessary but do not remove any. N.B. If your project is benefitting additional groups of teachers e.g. teaching assistants please add relevant columns to reflect this.

7.1 Teacher Sub-Groups (teachers directly benefitting counted once during the project)

Please provide your definition for number of benefitting teachers and when this was collected below *(maximum 100 words).*

Approximately 661 primary school teachers benefitted from the project between September 2014 to July 2015. This figure does not include the 12 secondary school teachers delivering the project across the 9 Digital Schoolhouses.

The data for the number of primary teachers was collected upon attendance to a Digital Schoolhouse workshop or CPD event. Schools recorded attendance to each event hosted, and these were centrally collated throughout the year.

Unfortunately, many teachers chose not to disclose their years in the profession, so these columns have been left blank in Table 5. However, the sample of teachers that chose to disclose their experience in our assessment tool provides us with a broad picture of the makeup of the group.

Table 5 – Teachers benefitting from the programme

	No. teachers	**% NQTs** ***(in their 1st year of teaching when they became involved)***	**% Teaching 2 – 3 yrs** ***(in their 2nd and 3rd years of teaching when they became involved)***	**% Teaching 4 yrs +** ***(teaching over 4 years when they became involved)***	**% Primary (KS1 & 2)**	**% Secondary (KS3 - 5)**
Project Total	*661*					
Acland Burghley	*4*				*100%*	
Acton High	*62*				*100%*	
Highgate Wood	*96*				*100%*	

Holloway School	*37*				*100%*	
Preston Manor	*75*				*100%*	
Regent High	*197*				*100%*	
Richmond Park	*3*				*100%*	
Townley Grammar	*105*				*100%*	
Woodford County	*69*				*100%*	

7.1.2 Please provide written commentary on teacher sub-groups e.g. how this compares to the wider school context or benchmark *(maximum 250 words)*

Based on teacher survey data	**No. teachers**	**% NQTs** ***(in their 1st year of teaching when they became involved)***	**% Teaching 2 – 3 yrs** ***(in their 2nd and 3rd years of teaching when they became involved)***	**% Teaching 4 yrs +** ***(teaching over 4 years when they became involved)***	**% Primary (KS1 & 2)**	**% Secondary (KS3 - 5)**
Total responses	*76*	*11.7%*	*20.5%*	*64.7%*	*100%*	

7.2 Pupil Sub-Groups (these should be pupils who directly benefit from teachers trained)

Please provide your definition for number of benefitting pupils and when this data was collected below *(maximum 100 words)*

Workshops were delivered throughout the year by our Digital Schoolhouses, and attendance to these were recorded and collated centrally. It is these pupils that are being reported as benefitting from the project. However, it was not possible to collect details on pupils ethnicity, pupil premium and attainment levels. Therefore, the tables below have been left blank for these sections.

Anecdotal evidence indicates a wider group of pupils subsequently benefitting from the teachers involved in the project. These include, primary school pupils not attending Digital Schoolhouse workshops, and the Digital Schoolhouse lead teachers own Year 7 to Year 13 students. However, because this fell beyond the scope of the research intended, quantifiable data was not collected and these numbers will not be reported below.

Tables 6-8 – Pupil Sub-Groups benefitting from the programme

	No. pupils	% LAC	% FSM	% FSM last 6 yrs	% EAL	% SEN
Project Total	*5576*					
Acland Burghley	*60*					
Acton High School	*316*					
Highgate Wood School	*916*					
Holloway School	*505*					
Preston Manor School	*527*					
Regent High School	*1743*					
Richmond Park Academy	*80*					
Townley Grammar School	*715*					
Woodford County High School	*652*					

	No. Male pupils	No. Female pupils	% Lower attaining	% Middle attaining	% Higher attaining
Project Total					
School 1					
School 2					
School 3					
School 4					

	% Asian Indian	% Asian Pakistani	% Asian Bangladeshi	% Asian Any Other background	% Black Caribbean	% Black African	% Black Any Other Background	% Mixed White & Black Caribbean	% Mixed White & Black African	% Mixed White & Asian	% Mixed Any Other Background	% Chinese	% Any other ethnic group
Project Total													
School 1													
School 2													
School 3													
School 4													

	% White British	% White Irish	% White Traveller of Irish heritage	% White Gypsy/Roma	% White Any Other Background
Project Total					
School 1					
School 2					
School 3					
School 4					

7.2.1 Please provide a written commentary on your pupil data e.g. a comparison between the targeted groups and school level data, borough average and London average *(maximum 500 words)*

Useful links: London Data Store, DfE Schools Performance, DfE statistical releases

Since pupil sub-group data was not collected, a comparison of the Digital Schoolhouse cohort of pupils against borough and London averages is not applicable. However, the school level data and pupil population characteristics are listed below. The Digital Schoolhouses characteristics are in bold. Since approx. 70 different primary schools were supported, the list below contains a sample of that number. A single primary school for each Digital Schoolhouse was chosen (and therefore listed immediately below it); the primary school was selected based on the number of visits made to the Digital Schoolhouse. Therefore, each of the primary schools listed below are amongst those that had the greatest involvement in the Digital Schoolhouse programme.

Digital Schoolhouses in bold, primary school listed below	Number of pupils on roll	No. of boys on roll	No. of girls on roll	Percentage of pupils with SEN with statements or on School Action Plus	Percentage of pupils with EAL	Percentage of FSM	Percentage of FSM over 6 years
Highgate Wood School	***1446***	***791***	***655***	***4.7***	***28.1***	***22.2***	***41.7***
Coleridge Primary School	*906*	*49%*	*51%*	*6.8*	*15.8*	*9.9*	*15.5*
Townley Grammar	***1434***	***0***	***1434***	***2.9***	***12***	***3.1***	***10.4***
Lessness Heath Primary School	*649*	*51%*	*49%*	*8*	*20.5*	*19.7*	*27.8*
Acton High School	***1275***	***69%***	***31%***	***16.2***	***65.2***	***37.4***	***59***
Derwentwater Primary School	*745*	*48%*	*52%*	*7.7*	*68.7*	*29.7*	*43.6*
Holloway School	***794***	***70%***	***30%***	***15.2***	***33.8***	***54.7***	***75.7***
Gillespie Primary School	*238*	*53%*	*47%*	*4.2*	*44.1*	*33.9*	*45.7*

Preston Manor School	***1825***	***51%***	***49%***	***7.8***	***62.5***	***19.7***	***42.1***
Uxendon Manor Primary School	*477*	*55%*	*45%*	*4.4*	*83.3*	*13.3*	*23.1*
Regent High School	***780***	***59%***	***41%***	***9.4***	***84.6***	***48.8***	***74.7***
Kingsgate Primary School	*520*	*53%*	*47%*	*11.3*	*80.3*	*45.2*	*64.4*
Richmond Park Academy	***521***	***55%***	***45%***	***6.0***	***28.4***	***23***	***48.4***
Clarendon School	*117*	*72%*	*28%*	*100*	*32.5*	*40.5*	*47.9*
Woodford County High School	***876***	***0***	***100%***	***0.3***	***67***	***5***	***10.7***
Churchfields Junior School	*480*	*51%*	*49%*	*4*	*21.3*	*9.2*	*11.7*

8. Project Impact

You should reflect on the project's performance and impact and use **qualitative and quantitative** data to illustrate this.

- Please complete the tables below before providing a narrative explanation of the impact of your project.
- Please state how you have measured your outcomes (e.g. surveys) and if you are using scales please include details.
- Please add graphical analysis (e.g. bar charts) to further demonstrate project impact on each teachers, pupils, wider system outcomes etc. If you use graphs, please ensure that all charts are explained and have clear labels for the axes (numeric data or percentages, for example) and legends for the data.

Please add columns to the tables if necessary but do not remove any. ***N.B. If your project is collecting data at more than two points and may want to add additional data collection points.***

8.1 Teacher Outcomes

Date teacher intervention started: June 2014

Table 9 – Teacher Outcomes: teachers benefitting from the project

The 1st Return will either be your baseline data collected before the start of your project, or may be historical trend data for the intervention group. Please specify what the data relates to.

Target Outcome	Research method/ data collection	Sample characteristics	Metric used	1st Return and date of collection	2nd Return and date of collection
Primary teachers: Increased teacher knowledge and understanding across a range of measures	Online survey	76 respondents from a total of 263 invites	Mean score based on a 1-10 scale (1 - I don't know what this is, 10 - highly confident)	N/A	Mean score across indicators - 4.3. **Various dates throughout the year – completed when attending CPD course.**
Primary teachers: Increased teacher confidence in delivery across a range of measures	Online survey	76 respondents from a total of 263 invites	Mean score based on a 1-10 scale (1 - I don't know what this is, 10 - highly confident)	N/A	Mean score across indicators - 4.0. **Various dates throughout the year – completed when attending CPD course.**

DSH teachers: Increased teacher confidence in understanding across a range of measures	Word survey ('Lead Teacher TNA')	9 respondents from a total of 9 invites **-** NB that not all teachers responded to both surveys	Mean score based on a 1-10 scale (1 - no confidence, 10 - highly confident)	Mean score across indicators - 7.8. **July 2014.**	Mean score across indicators - 9.4. **July 2015.**
DSH teachers: Increased teacher knowledge and ability across a range of measures	Word survey ('Teacher Skills Audit')	8 respondents from a total of 9 invites **-** NB that not all teachers responded to both surveys	Categorical scale - checked or unchecked	Average of 90% of measures checked. **July 2014.**	Average of 96% of measures checked. **July 2015.**
DSH teachers: Increased teacher knowledge and understanding, and confidence in delivery, across a range of measures	Word survey ('DSH Teachers Audit')	9 respondents from a total of 9 invites **-** NB that not all teachers responded to both surveys	Mean score based on a 1-4 scale (1 - not at all, 4 - confident understanding/delivery)	**July 2014.**	**July 2015.**
All teachers: increased teacher knowledge and understanding, and confidence in delivery, across a range of measures	Lesson observation sheets (external observers)	11 lesson observations, covering all DSH schools	Open commentary	**N/A**	Various June – July 2015
DSH teachers: increased teacher knowledge and understanding, and confidence in delivery, across a range of measures	Teacher feedback forms (paper and online)	7 feedback forms	Open commentary	**N/A**	Various

Primary teachers: increased teacher knowledge and understanding, and confidence in delivery, across a range of measures	Teacher feedback forms (paper)	8 feedback forms	Open commentary	**N/A**	Various

The analysis also included informal feedback from teachers.

Table 10 – Comparison data outcomes for Teachers *[if available]*

Target Outcome	Research method/ data collection	Sample characteristics	Metric used	1st Return and date of collection	2nd Return and date of collection
e.g. Increased Teacher confidence	*e.g. E-survey*	*e.g. 100 respondents from a total of 200 invites.* *The profile of respondents was broadly representative of the population as a whole.*	*e.g. Mean score based on a 1-5 scale (1 – very confident, 2 – quite confident, 3 neither confident nor unconfident, 4 - quite unconfident, 5 – very unconfident)*	*e.g. Mean score*	*e.g. Mean score*
No comparison group	*No comparison group*	*No comparison group*	*No comparison group*	*No comparison group*	*No comparison group*

8.1.1 Please provide information (for both the intervention group and comparison group where you have one) on:

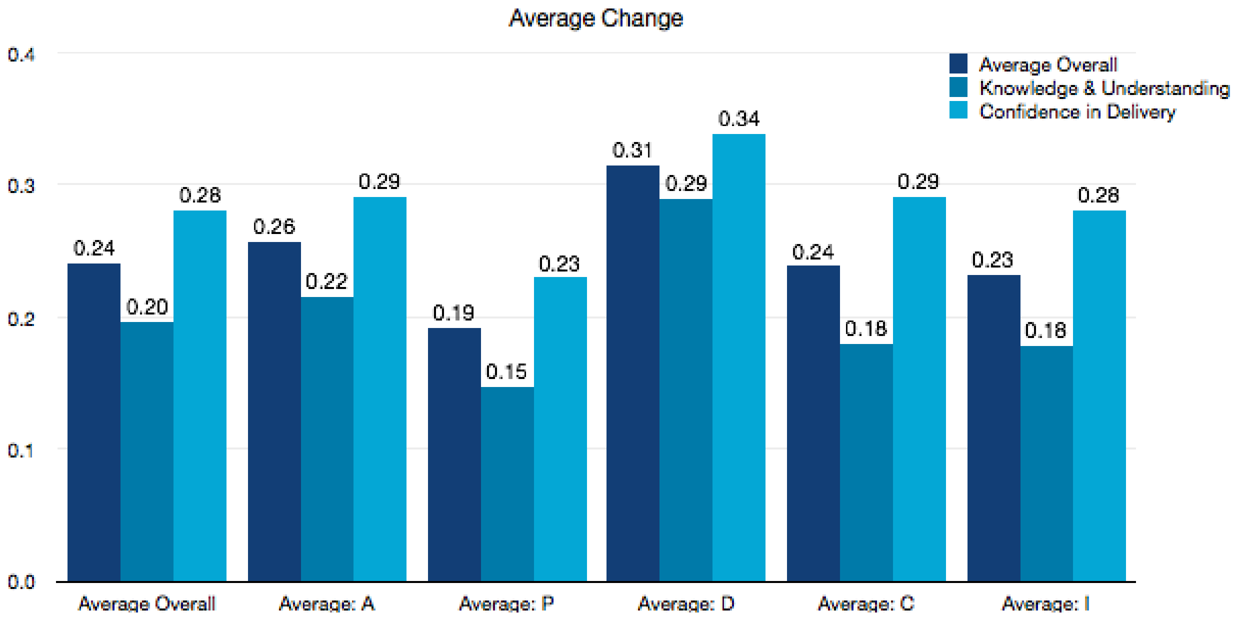
- Sample size, sampling method, and whether the sample was representative or not
- Commentary on teacher impact (please also refer to table 5 re impact on different groups of teachers)
- Qualitative data to support quantitative evidence.
- Projects can also provide additional appendices where appropriate.

(Minimum 500 words)

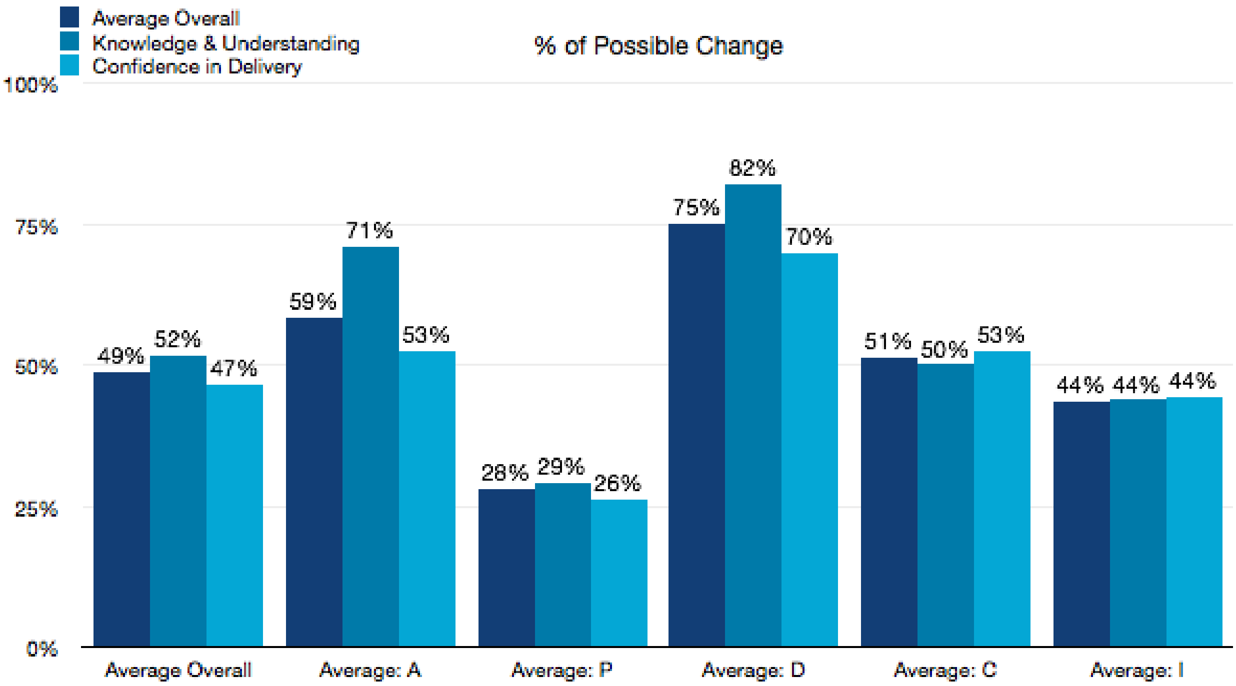
As noted in the limitations section and methodology, we were unable to use the primary teacher survey to measure impact, as data was only available for the endline assessment. There were no comparison groups against which to compare outcomes. Of the available Digital Schoolhouse teacher data, three measures were available that compared the knowledge, understanding and skills of teachers both before their involvement in Digital Schoolhouse, and after. Each measure compared similar areas; the measure based on the teacher training agency requirements ('DSH Teachers Audit' in the table above) was selected on the basis that it had the richest and most nuanced data. All nine teachers responded to the audit over the course of both surveys, although one teacher did not respond to the baseline survey and two teachers did not respond to the endline survey. Qualitative evidence regarding the impact of the programme on primary teachers from visiting schools has been gathered from teachers' written feedback and assessments made by independent Digital Schoolhouse lesson observers.

Anticipated outcomes for teachers from participation in the Digital Schoolhouse programme included increased subject knowledge and greater awareness of subject specific teaching methods, as well as increased teacher confidence for all Digital Schoolhouse teachers and participating primary teachers. With the establishment of these outcomes, in addition to the use of better computing resources, the long-term goal of the Digital Schoolhouse is the delivery of higher quality computing teaching.

Graph 1: Average Change in Teachers' Knowledge and Understanding, and Confidence in Delivery



Graph 2: % of Possible Movement in Teachers' Knowledge and Understanding, and Confidence in Delivery



Key:

A - Algorithms
P - Programming and Development
D - Data and Data Protection
C - Computers and Social Informatics
I - Communication and the Internet

Survey responses from secondary teachers suggest a positive change in both knowledge and understanding, and confidence in delivery, following their involvement in the Digital Schoolhouse. These figures, however, should be interpreted in light of small respondent numbers and lack of statistical testing. The overall average change observed among secondary teachers before and after the Digital Schoolhouse involvement is 0.24 on an overall scale of 4. While this change would appear small in absolute terms, in relative terms it nonetheless suggests a significant change on the part of teachers, as it represents 48% of the overall movement possible.

Survey responses from the primary teacher endline assessment, while not included in the overall evaluation, indicate that teachers' knowledge and understanding is considerably higher than that of their confidence in delivery; this provides an interesting counterpoint to the Digital Schoolhouse teacher analysis, which shows that teachers' levels of confidence in delivery have increased further than their knowledge and understanding, perhaps because baseline levels of confidence are lower and it is therefore easier to make a positive difference.

The change in teachers' confidence and knowledge was highest in the areas of data/data protection and algorithms. Written feedback from lesson observers and secondary teachers also indicates a positive impact from the Digital Schoolhouse involvement, particularly in terms of confidence, curriculum understanding and pedagogical approaches. Lesson observers noted, however, that the extent to which participation in Digital Schoolhouse increases subject knowledge and pedagogy among primary teachers '*very much depends*'. Observers noted that, on some occasions, the individual accompanying primary pupils to the workshops was not their actual primary teacher, but a teaching assistant or another member of staff. This was seen by the lesson observers as being detrimental to the objective of providing continuing professional development for primary school teachers. It was suggested that UKIE needs to be more specific in marketing the CPD objective to primary schools in order to overcome this issue.

Other key findings are as follows:

- Teachers learned new approaches to teaching computing through Digital Schoolhouse, some of which are carried over to other curriculum areas such as literacy and topic work. Unplugged activities can be particularly useful for primary school teachers, but insufficient time is dedicated to them, in some cases, by Digital Schoolhouse teachers.

- Primary school teachers found particular benefit from Digital Schoolhouse in enabling them to understand the computing curriculum.

8.2 Pupil Outcomes

Date pupil intervention started: September 2014

Table 11 – Pupil Outcomes for pupils benefitting from the project

The 1st Return will either be your baseline data collected before the start of your project, or may be historical trend data for the intervention group. Please specify what the data relates to.

Target Outcome	Research method/ data collection	Sample characteristics	Metric used	1st Return and date of collection	2nd Return and date of collection
Increased educational attainment and progress in computing: algorithms	Online pupil survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.4. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 3.1. **Various dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing: programming	Online pupil survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.1. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 2.7. V**arious dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing: data representation	Online survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.4. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 2.7. **Various dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing: communication	Online survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.6. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 3.0. **Various dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing: hardware	Online survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.2. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 2.8. **Various dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing: IT	Online survey	261 responses from a total of 3058 invited	Mean score based on a 1 to 4 scale (0 - I don't know what this means, 4 - I understand this well enough to explain it to my friends)	Mean score - 2.4. **Various dates throughout the year – completed prior to attending workshop.**	Mean score - 2.9. **Various dates throughout the year – completed after attending workshop.**

Increased educational attainment and progress in computing	Pupil feedback forms (paper)	60 feedback forms from a total of 5076 invited **random sample of total collected**	Open commentary.	**Various dates throughout the year – completed prior to attending workshop.**	**Various dates throughout the year – completed after attending workshop.**
Increased educational attainment and progress in computing	Lesson observation sheets (external observers)	11 lesson observations, covering all DSH schools	Open commentary	**N/A**	Various June-July 2015
Increased educational attainment and progress in computing	DSH teacher feedback forms (paper and online)	7 feedback forms	Open commentary	**N/A**	Various
Increased educational attainment and progress in computing	Primary teacher feedback forms (paper)	8 feedback forms	Open commentary	**N/A**	Various

Table 12 - Pupil Outcomes for pupil comparison groups *[if available]*

Target Outcome	Research method/ data collection	Sample characteristics	*Metric used*	1st Return and date of collection	2nd Return and date of collection
e.g. *Increased educational attainment and progress in Writing*	*e.g. Pupil assessment data*	*e.g. Characteristics and assessment data collected for 97 of 100. The profile of respondents matches that initially targeted in the Theory of Change.* *Please find detailed analysis of the profile of respondents in Section 7.2*	*e.g. mean score or percentage at diff National Curriculum Levels or GCSE grades*	*e.g. Mean score- 3.7, collected September 2015*	*e.g. Mean score- 4.5, collected June 2015*
No comparison group	*No comparison group*	*No comparison group*	*No comparison group*	*No comparison group*	*No comparison group*

8.2.1 Please provide information (for both the intervention group and comparison group where you have one) on:

- Sample size, sampling method, and whether the sample was representative or not Commentary on pupil impact (please also refer to table 6-8 re impact on different groups of pupils)
- Qualitative data to support quantitative evidence.
- Projects can also provide additional appendices where appropriate.

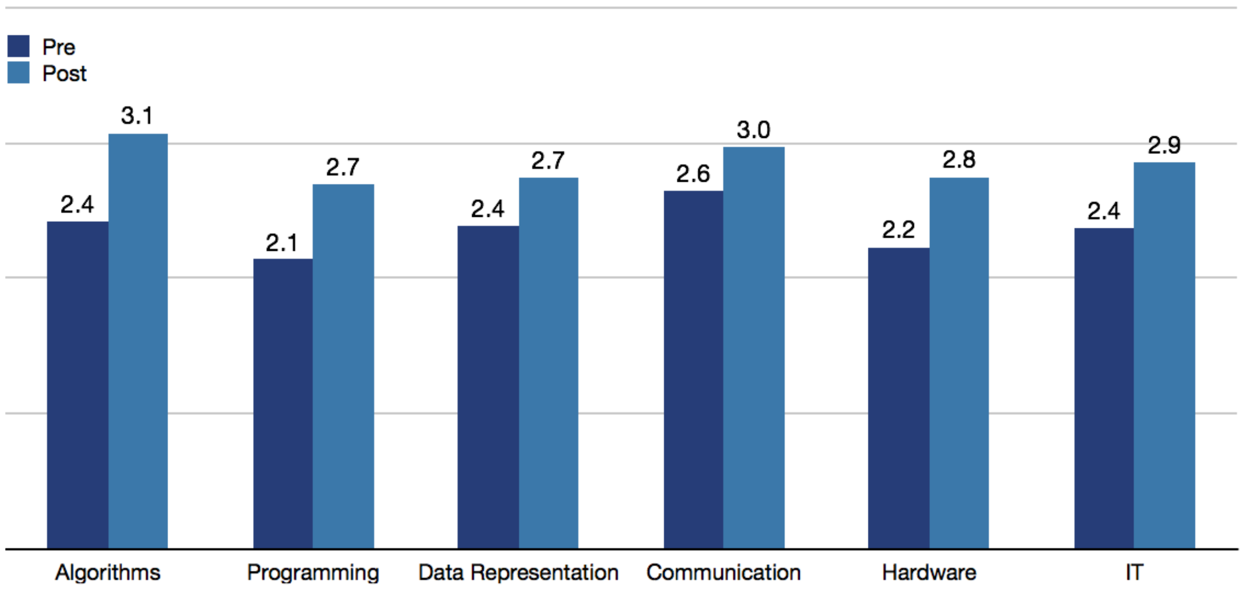
(minimum 500 words)

Primary school pupils who attended the workshops were assessed on their educational attainment and progress in computing in the following areas: algorithms, programming, data representation, communication, hardware and IT. 261 responses were achieved from a total of 3,058 pupils who were invited, which is a response rate of 8.5%. No information is available on whether this is a representative sample.

It should be noted that greater impact was anticipated to be observable in teachers than in the pupils involved in the Digital Schoolhouse project. Longer term impact is likely to be achieved for pupils, however, through teachers' increased levels of knowledge, understanding and confidence in delivery. Some positive impacts were observed amongst pupils as follows:

- Pupils, on average, showed significant gains in educational attainment and progress in computing across the areas measured: algorithms, programming, data representation, communication, hardware and IT.
- The greatest learning was observed by pupils in computer terminology, coding and being able to make their own game or world.
- While pupils learned new techniques, it was harder for them to grasp the underlying concepts.

Graph 3. Change in educational attainment and progress in computing



Pupils showed significant gains over the course of the workshop across all areas: algorithms, programming, data representation, communication, hardware and IT. The average change across all areas was 0.48 out of 4; the difference between the baseline and the endline numbers was statistically significant. This represented an average increase of 21%, or 30% of the maximum increase possible. No statistically significant differences were found in increased attainment and progress by gender. Teachers were also positive about the progress their pupils were making, and attributed this progress to the Digital Schoolhouse sessions.

Many pupils commented that they had learned a great deal through Digital Schoolhouse sessions. Pupils most commonly mentioned computer terminology as an area of new learning, followed by coding (two commented further that they had learned that coding can be fun) and then learning how to make their own game or world. Scratch was highlighted in particular as a programme in which new techniques had been learned.

While pupils clearly learned new techniques and left the sessions feeling enthused, however, lesson observers noted that they were unsure how many of the underlying concepts had been understood. Observers also commented that some secondary teachers were unable to put the lesson contents into the context of a primary setting and, thus, certain parts were either too advanced or delivered too fast for pupils to comprehend fully.

Other areas of impact included the following:

- Teachers saw increased confidence and motivation in their pupils. All but one of the teachers made positive comments about the children's experience of the workshops, describing the pupil's experiences using terms such as '*engaged', 'enjoyed'* or *'excited'*.
- The 'buddy system' element of the programme was highlighted by one teacher as being particularly effective for special needs pupils.
- The potential for possible long-term employment impact was suggested by some of the pupils' impact; an increased interest in computers had made a few begin to consider it as an area in which they may like to work in the future.

8.3 Wider System Outcomes

Table 13 – Wider System Outcomes

Target Outcome	Research method/ data collection	Sample characteristics	*Metric*	1st Return and date of collection	2nd Return and date of collection
Teachers/schools involved in intervention make greater use of networks	Lesson observation sheets (external observers)	11 lesson observations, covering all DSH schools	Open commentary	**N/A**	Various June - July 2015
Teachers/schools involved in intervention make greater use of networks	DSH teacher feedback forms (paper and online)	7 feedback forms	Open commentary	**N/A**	Various
Teachers/schools involved in intervention make greater use of networks	Primary teacher feedback forms (paper)	8 feedback forms	Open commentary	**N/A**	Various

8.3.1 Please provide information on *(minimum 500 words):*

- Sample size, sampling method, and whether the sample was representative or not
- Commentary on wider system impact qualitative data to support quantitative evidence.
- Projects can also provide additional appendices where appropriate.

There were no quantitative measures attached to wider system outcomes, and therefore no sampling occurred. Qualitative evidence on wider system outcomes was drawn from teacher and pupil feedback forms, as well as through commentary gathered from independent external observers.

The most significant benefit reported by teachers and schools was observed in the links that were developed with other schools and the wider networks that the programme facilitated. The majority of Digital Schoolhouse feedback respondents identified links with other schools as a key benefit of the project; one respondent, for example, said that it served as an '*invaluable hub for new technology*'. Links with the wider community, in terms of outreach work, was also a noted benefit.

Related to this impact on the development of networks was a further observed impact on support for primary to secondary pupil transitions. A Digital Schoolhouse teacher, for example, commented on an expectation that the project would give primary school pupils a *'flying start'* as they transition between primary school and secondary school.

This positive impact on transitions can be attributed to a number of factors, including better relationships between secondary schools and their feeder primaries and giving pupils an open opportunity to experience the school which they may later attend. According to the external observers, activities designed to promote transition can often feel fake and were usually very difficult to organise and implement, whereas those run through the Digital Schoolhouse handled made the experience feel more normal. Secondary schools also became more familiar with the curricula and expectations at Key Stage 2 level through their experience of the programme, and so were able to prepare better for pupil transition. The impact on transition between primary and secondary school was also noted as being experience feel 'hby the Digital Schoolhouse lesson observers. Pupils also noted that they were more aware of the secondary school they may attend in future, and that they had a more realistic expectation of what their secondary school experience may entail.

Other identified areas of wider system impact are as follows:

- Digital Schoolhouse can support primary schools to improve school and lesson planning. A workshop exercise which assessed children's levels of prior learning port lighted what the children need to know/identified gaps that can be targeted in our planning', according to one teacher. Involvement also helped to increase understanding of the computing curriculum at a whole school level.
- Perceived benefits of Digital Schoolhouse for individual schools included raising the profile of the school and providing an opportunity for community outreach.
- In some cases, there was evidence that the impact of the Digital Schoolhouse programme extended beyond the school. Three pupils said that they would show what they had learned to members of their family. As one pupil commented: mmented: outreach. ore realistic expectation of what their secondary gether'. This was echoed in the comments of one primary school teacher who said that the workshop fostered collaboration between pupils, and that the pupils who attended the workshop 'can be ambassadors for others'.

8.4 Impact Timelines

Please provide information on impact timelines:

- At what point during/after teacher CPD activity did you expect to see impact on teachers? Did this happen as expected?
- At what point during/after teacher CPD activity did you expect to see impact on pupils? Did this happen as expected?
- At what point did you expect to see wider school outcomes? Did this happen as expected?
- Reflect on any continuing impact anticipated.

Impact on Teachers
We anticipated seeing immediate engagement with teachers and improved motivation and confidence with the new curriculum almost immediately during and directly after attending the Digital Schoolhouse workshops. A deeper understanding of computing concepts and new approaches to teaching the subject were expected within a shorter three month period after the teacher's had had the opportunity to engage with sustained and personalised CPD and support. The impact for Digital Schoolhouse teachers was expected to be seen by the end of the academic year.

Qualitative results clearly show that the workshops did succeed in increasing teacher confidence and raising awareness of the new curriculum and resources available to teach it. These findings were collected both during the workshop and directly after it had ended. Some results were returned by primary teachers a fortnight after it being requested. All findings were consistent. The impact on the Digital Schoolhouse teachers was as expected, improvements were seen according to the original schedule.

Impact on Pupils
Short term impact on pupils was anticipated to occur during and immediately after the workshop. We hypothesised that pupils would be engaged, inspired, raised confidence levels and have some impact on educational attainment. Longer term impact and a greater increase in educational attainment was expected within a term of attending the Digital Schoolhouse workshop after the primary teachers had engaged with extended support and CPD.

Qualitative results clearly show that this went as expected. Pupils were engaged and inspired, with quantitative data supporting an increase in educational attainment. Unfortunately because we were unable to collect primary teacher baseline data we are unable to correlate teacher impact with pupil impact.

Impact on Wider School Outcomes
We expected to see wider school outcomes becoming clearer towards the end of the academic year. However, some changes became quite apparent quite early on in the school calendar. Digital Schoolhouse teachers reported greater interest at school Open Evenings in the autumn term, and head teachers reported increased uptake of GCSE Computing in the spring term. Secondary school staff attributed participation in the DSH project as a contributory factor in both cases.

Continued Impact
A lot of the impact of the Digital Schoolhouse goes beyond a single academic year. Therefore, examining impact is going to be a key part of the project in 2015/2016. Each of the Digital Schoolhouses that have continued has within their new year 7 cohort a number of pupils that previously attended a Digital Schoolhouse workshop as part of their primary school experience. We will be working to see if we can measure any differences between these pupils and non-DSH pupils within the cohorts. Other factors to look into going forward will be the Digital Schoolhouse teachers own experiences of teaching these classes, and revisiting the primary schools that participated in the first year.

Continued Wider Impact
Digital Schoolhouse expertise has been used in several projects with partner organisations that go beyond the core activity of delivering cross curricular workshops within the primary to secondary transition phase. These projects are important as they help extend the reach of the Digital Schoolhouse nationwide. While there was no pre-determined timeline for such events they have remained ongoing throughout the year as needs and opportunities arise, and will continue to be developed in 2015/2016 academic year. Some examples of current projects with impact expected to continue into 2016 are:

- University College London – developing a series of unplugged programming materials and providing teacher training to support delivery
- Embedding Computing: Guidance for School Leaders – this has been developed in association with the Education Foundation, NAACE and Progression Pathways.
- 12th Intel Education Summit – a contributor to the event, key policy makers from around the world will be introduced to the play based learning concepts developed within the Digital Schoolhouse.

9. Reflection on overall project impact *(maximum 1,500 words)*

In this section we would like you to reflect on:

- The overall impact of your project
- The extent to which your theory of change proved accurate
- How your project has contributed to the overall aims of LSEF
- Whether your findings support the hypothesis of the LSEF
- What your findings say about the meta-evaluation theme that is most relevant to you

Please illustrate using the key points from the previous detailed analysis.

All the evidence should be brought together here (achievement of outputs and outcomes, and the assessment of project impact) to produce well informed findings, which can be used to inform policy development in a specific area as well as the meta-evaluation of the LSEF.

The London Schools Excellence Fund (LSEF) is based on the hypothesis that investing in teaching, subject knowledge and subject-specific teaching methods and pedagogy will lead to improved outcomes for pupils in terms of attainment, subject participation and aspiration.

The aims of the Fund:

I. Cultivate teaching excellence through investment in teaching and teachers so that attention is re-focused on knowledge-led teaching and curriculum.

II. Support self-sustaining school-to-school and peer-led activity, plus the creation of new resources and support for teachers, to raise achievement in priority subjects in primary and secondary schools (English, mathematics, biology, chemistry, computer science, physics, history, geography, languages).

III. Support the development of activity which has already been tested and has some evaluation (either internal or external), where further support is needed to develop the activity, take it to scale and undertake additional evaluation.

IV. In the longer term, create cultural change and raise expectations in the London school system, so that London is acknowledged as a centre of teaching excellence and its state schools are among the best in the world.

Overall project impact

One of the key benefits of the project was demonstrated in improved school-to-school relations and a better experience of transition for schools and pupils; this was widely commented on by pupils, teachers and lesson observers. Pupils clearly increased their levels of educational attainment and progress across a number of measures. Responses from teachers also suggest that the programme has brought a variety of benefits for pupils, including experiencing resources and technologies not usually available to them and increased confidence and motivation. According to feedback forms from pupils, the workshops taught pupils new things about computing and increased their desire to do more with computers.

While pupils learned more about techniques than they did about underlying concepts, the project was designed to have impact on teachers (who, in the longer term, will then have an impact on their pupils through improved knowledge, understanding and confidence in delivery). The clear impact on educational attainment and progress, combined with impact on pupil motivation and engagement, is therefore an important result of Digital Schoolhouse as it went above and beyond project expectations.

There is also evidence to suggest that the Digital Schoolhouse programme has had a positive impact on the teachers involved. Survey responses suggest a positive difference in secondary teachers' confidence in delivery, and knowledge and understanding after programme participation. The most notable benefit experienced by primary teachers is in (a) increased curriculum understanding and (b) awareness of using computing resources in class. A lack of baseline data for primary teachers, however, combined with the small number of Digital Schoolhouse teachers involved in the project, means that the quantitative evidence base for this is limited; these findings are, however, supported by qualitative findings.

Accuracy of the Theory of Change

The initial theory of change was very complex, so it is not possible to verify whether all the impact chains are accurate. It is, however, clear that intended outcomes are supported by the evidence available, including improved transition between primary and secondary; increased teacher confidence in computing; and teachers making better use of networks (although this is not necessarily to 'improve subject knowledge' as stated in the theory of change). There is less evidence available for the other intended outcomes, although this is arguably because of lack of relevant data rather than absence of impact.

Contribution to the overall aims of LSEF, and extent to which findings support the hypothesis of the LSEF

The Digital Schoolhouse project has invested in teaching and teachers, resulting in (data limitations around teacher outcomes notwithstanding) greater knowledge-led teaching and curriculum. Findings from teachers and pupils involved in the Digital Schoolhouse programme also appear to support the LSEF hypothesis that investing in teaching, subject knowledge and subject specific teaching methods will lead to improved outcomes for pupils in terms of attainment and subject participation. The majority of pupils reported learning new things as a result of attending the workshop, particularly in terms of learning new computer words and learning how to code and program on a computer. It is difficult to determine the extent of pupils' progress, however, in the absence of quantitative data measuring changes in attainment before and after the Digital Schoolhouse. According to the lesson observers, while the extent of pupils' progress varied, an improvement of subject knowledge was seen as possible where lesson planning was delivered at the right level of pupils.

With regards to subject participation, the vast majority of pupils said that attending the workshop had increased their desire to do more with computers. Similarly, many teachers commented that pupils were engaged or excited during the workshops. While neither teachers nor pupils were asked explicitly regarding the impact of the programme on pupils' aspirations, a few pupils commented that they wanted to pursue careers related to computer science or media when older.

Meta-evaluation findings

Various findings relate to the benefits and challenges of working across Key Stage 2 and Key Stage 3. The greatest benefit appeared to be increased experience of transition for both providing and receiving schools, as well as the pupils themselves; this was noted as being a very significant and successful aspect of the Digital Schoolhouse programme. Another key benefit of working across education stages was developing better relations between primary and secondary schools. According to some participants, this aspect had been a key benefit of programme involvement.

The main challenge related to working across Key Stage 2 and Key Stage 3 appeared to be regarding the appropriateness of lesson content. Lesson observers noted that some of the content presented at workshops was too advanced for primary pupils to understand. Similarly, many secondary teachers said pitching the lesson at the right level and adapting the terminology to fit primary pupils were some of the challenges of the programme.

10. *Value for Money*

A value for money assessment considers whether the project has brought about benefits at a reasonable cost. Section 5 brings together the information on cost of delivery which will be used in this section.

10.1 Apportionment of the costs across the activity

Please provide an estimate of the percentage of project activity and budget that was allocated to each of the broad activity areas below. Please include the time and costs associated with planning and evaluating those activity areas in your estimates.

Broad type of activity	Estimated % project activity	£ Estimated cost, including in kind
Producing/Disseminating Materials/Resources	Continued activity throughout, unable to quantify as percentage	33803.64
Teacher CPD (events & 1:1)	10	168936.72
Pupil Workshops Delivered	80	
DSH Lead Teacher Training	10	6652.06
TOTAL	100%	£339, 168 (same as total cost in section 5)

Please provide some commentary reflecting on the balance of activity and costs incurred: Would more or less of some aspects have been better?

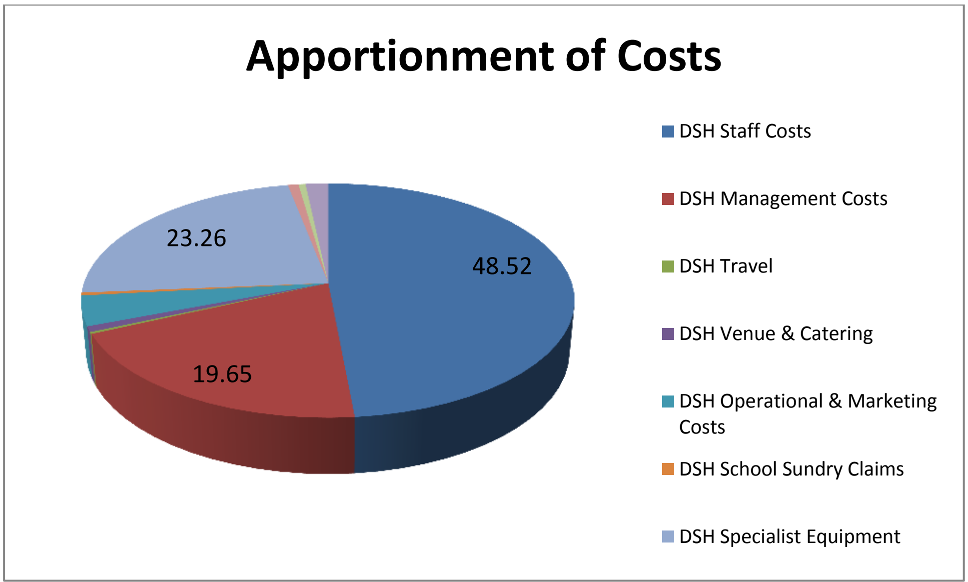


Figure 4 - Apportionment of Costs across the project

This project is built upon personnel carrying out a number of activities over an extended period of time. As with any project of this nature the key cost involved in making it happen therefore is staff costs and make up the bulk of the budget (68%). These include: Ukie management costs, project manager, Digital Schoolhouse teacher salary contributions and consultants. The second largest cost (23%) went towards purchasing specialist equipment for the schools. This cost was lower than originally anticipated, as the Digital Schoolhouses selected already had the necessary hardware to run most workshops. The funds spent therefore, helped the purchase of more specialist devices including: Raspberry Pi's, Arduino boards, DIY Gamer Kit, 3Doodler pens, iPads and more. These were necessary to help us meet the demand of primary schools needing support with embedding physical computing in their curriculum. Purchases such as the

3Doodler pens and DIY Gamer kits have also helped us create a unique set of curriculum materials that set us out as truly innovative. The Digital Schoolhouses are the first schools in the country to embed the 3Doodler pen into the classroom, and have been recognised accordingly (EDU Spotlight: Computational Thinking - http://the3doodler.com/education/)

10.2 Commentary of value for money

Please provide some commentary reflecting on the project's overall cost based on the extent to which aims/objectives and targets were met. If possible, draw on insight into similar programmes to comment on whether the programme delivers better or worse value for money than alternatives.

Each Digital Schoolhouse claimed for the activity they carried out through the year. The amount of money payable to schools therefore takes into account:

- The number of workshops delivered
- The number of CPD events delivered
- Cover for attendance to meetings
- Sundry and supplies cost
- Preparation time for delivering events and workshops (in accordance with salary)
- Additional resources bid for to help deliver the Digital Schoolhouse programme

The table below lists the claims made by each school and calculates the average amount of money spent per pupil/workshop/teachers.

DSH's	Total Claim	Cost/Pupils	Cost/Primary	Cost/Wrkshps	Cost/CPD	Cost/teachers
Acland Burghley	£ 1,110.13	£ 18.50	£ 555.06	£ 555.06	£ -	£ 277.53
Acton High	£ 2,542.48	£ 8.05	£ 508.50	£ 231.13	£ 63.56	£ 41.01
Highgate Wood	£ 9,435.50	£ 9.65	£ 2,358.88	£ 285.92	£ 314.52	£ 98.29
Holloway School	£ 6,085.58	£ 12.05	£ 1,521.40	£ 357.98	£ 2,028.53	£ 164.48
Preston Manor	£ 18,729.00	£ 35.54	£ 2,675.57	£ 585.28	£ 1,702.64	£ 249.72
Regent High	£ 13,386.02	£ 7.68	£ 582.00	£ 278.88	£ 132.53	£ 67.95
Richmond Park	£ 1,849.80	£ 23.12	£ 1,849.80	£ 231.23	£ -	£ 115.61
Townley Grammar	£ 9,610.91	£ 13.44	£ 961.09	£ 400.45	£ 168.61	£ 91.53
Woodford County	£ 26,189.00	£ 40.17	£ 1,745.93	£ 1,091.21	£ 1,247.10	£ 379.55
Average	*£ 9,882.05*	*£ 15.95*	*£ 1,252.65*	*£ 446.93*		*£ 165.07*

Some key areas to note are:

- Acland Burghley only joined the programme in May 2015 and therefore was only able to deliver two pilot workshops and no CPD events.
- Richmond Park Academy worked with only 1 primary school, delivering intensive support to classes with Special Educational Needs. They began delivery in April 2015.

- Regent High delivered their workshops through Camden CLC attached to the school, they were therefore able to be flexible and deliver workshops on any and every day of the week. This and their existing primary school contacts is the reason behind the high number of pupils they supported.
- Woodford County had the highest claim, as they claimed the most preparation time and the maximum amount of resources available to them.

The average value per pupil is £15.95, and on average a workshop costs £446 to deliver. However, these numbers are skewed by Acland Burghley who were only able to put on two workshops and Woodford County which had the highest claims. If these schools are removed from the equation the average cost per workshop falls to approximately £360.

It is interesting to see that Highgate Wood School (that worked with 978 pupils) claimed less than 50% of what Woodford County High School claimed (worked with 652 pupils). The two schools had a very different approach to delivery, with the teacher at Highgate Wood being more experienced and already recognised in their participation with other initiatives such as Apps for Good. It is possible that this background enabled them to deliver the programme on fewer funds. However, Highgate Wood School's approach was to select fewer curriculum materials from the range available and deliver them over time to visiting schools. Woodford County High School had a wider range of activities on offer that primary schools could choose from. This approach meant that they needed the full range of physical computing devices to hand.

10.3 Value for money calculations

Note: This section is only required for projects with control or comparison groups

In order to demonstrate the cost effectiveness of the project we would like those projects who had control or comparison groups to provide some value for money calculations. Further guidance will be issued to support projects with this.

n/a

11. Reflection on project delivery

This section is designed to allow for a discussion of wider issues relating to the project. (maximum 1,500 words)

Please include reflection on the following:

11.1 Key Enablers and Barriers to Achievement

- *Were there internal and/or external factors which appear to have had an effect on project success, and how were these responded to (if applicable)?*
- *What factors need to be in place in order to improve teacher subject knowledge?*

11.2 Management and Delivery Processes

- *How effective were the management and delivery processes used?*
- *Were there any innovative delivery mechanisms and what was the effect of those?*
- *Did the management or delivery mechanisms change during the lifetime of the project and what were the before or after effects?*

11.3 Future Sustainability and Forward Planning

- *Do you have any plans for the future sustainability of your projects?*
- *What factors or elements are essential for the sustainability of your project?*
- *How have you/will you share your project knowledge and resources?*

1.1 Key Enablers and Barriers to Achievement

Success factors in school implementation

Two Digital Schoolhouse teachers offered suggestions for factors that supported the effectiveness of the programme in their school. These included having a Senior Leadership Team that 'embraced the whole programme', as well as having similar initiatives in the school occurring simultaneously, which complemented Digital Schoolhouse.[i] One secondary teacher said gaining feedback was '*essential for the development of the workshop*', as the school had found that some resources needed adapting to fit the needs of primary school students. The teacher recommended that other schools spend time reviewing the resources and liaising with primary teachers prior to the workshop in other to ensure that resources are suitable.

Appropriateness of content

Several teachers encountered challenges in pitching the lessons and workshops at the right level for primary school students. There were comments that the Digital Schoolhouse material was pitched both too high and too low, suggesting that one of the priorities for continued programme delivery may be to support teachers in interpreting the material according to pupils' needs. Some pupils commented on finding some of the material challenging, with insufficient time per subject. Lesson observers also noted that some of the content presented was too advanced for primary pupils to comprehend, particularly in terms of the terminology used in lessons. The lesson observers further noted that some teachers would link to concepts beyond that of the primary school curriculum without first covering basic content. One observer felt that content such as Python and compilers were beyond the capabilities of primary school pupils and should be removed from the workshop. The lesson observers suggested that additional pedagogical training would be helpful to ensure that secondary teachers use consistent language and thinking appropriate for primary school pupils.

Teaching and lesson delivery

The majority of pupils were positive regarding the delivery of the lessons. One pupil said it was one of the favourite lessons of the year, while another said it was the best computing lessons they had ever been in. The workshop was described by one student as '*an exciting and educational experience that I will never forget*'. In terms of what made the lesson particularly effective and enjoyable for students, one respondent commented that '*it made coding really fun*'. Another said that the lesson was very active because pupils always communicated with each other. A few pupils also made positive comments regarding the quality of teachers.

The most frequent suggestions for improving the workshops related to the use of terminology in lessons. For three teachers, there was a suggestion that terms Key Stage 2 key terms such as 'algorithm' or 'debugging' should be used more. Clearly a balance is important in the area, however; a suggested improvement for another teacher was *'too many technical terms; younger pupils may not need to know all vocabulary'*. Feedback from lesson observers included witnessing some teachers using inconsistent terminology or delivering incorrect teaching. Observers commented that some teachers had a weak grasp of computational thinking and limited understanding of the primary curriculum; this resulted in missed opportunities. It was suggested that teachers could use further guidance on the programme's aims and activities, particularly in terms of how to strike a balance between enthusing pupils and promoting computational thinking.

Use of resources

Feedback on the resources used in Digital Schoolhouse was overwhelmingly positive - all Digital Schoolhouse teacher respondents commented positively on the quality of the resources in their feedback forms. One teacher commented positively on the simplicity of the resources; another said that the lesson ideas and projects were *'innovative, comprehensive and easy to follow'*. One teacher discussed a link between the quality of the resources used in Digital Schoolhouse and the impact on pupils: *'the activities delivered have meant that my lessons are far more fun and inspiring for the pupils'*. There was some evidence in the feedback that primary school teachers intended to reuse or expand upon resources used in the workshops. A teacher said, for example: *'I will be taking as many of your ideas as i can remember back with me to our school'*.

It is difficult to compare activities and resources used in the Digital Schoolhouse, as the same resources were not intended to be delivered consistently by different schools involved in the programme. However, some key patterns emerge from the pupil feedback forms and score cards. When pupils were asked about the resources used in the workshops, a large proportion of pupils said that they enjoyed *'everything'.* The most frequently mentioned activity was making their own game or world, followed by the sand box game. Scratch was another popular activity among pupils, as it was mentioned frequently in pupils' score cards. Many pupils also said that they particularly liked learning the 21 card trick; two pupils commented that they enjoyed teaching this trick to others. The dance algorithm appeared to be the least favourite activity among pupils and was the only activity that received negative comments from pupils.

Certain resources were seen as being better than others in terms of promoting computational thinking among pupils. Lesson observers described the scratch algorithm as a great activity; Code Kingdom, on the other hand, was seen as being too quick and complex for pupils to understand. Resources, according to the observers, need to be less complex and instructional as the programme moves forward. Moreover, teachers were seen as needing additional training in how to teach pupils through using the resources.

Lesson observers also raised concerns that some activities designed to promote computational thinking among pupils had been removed by teachers from the workshop content. This was said to be due to limited time available for teachers to cover the intended content; often, workshops lasted only half a day whereas activities were planned for a full day. Teachers, according to the observers, would often prioritise covering practical exercises over unplugged activities introducing key concepts that may lead to a better understanding among pupils. To overcome this issue, the observers suggested making sure every workshop begins with unplugged activities and incorporating sample lesson plans - non prescriptive, but containing suggestions as to how much time ought to be spent on and off the computer at each workshop.

Programme challenges

Digital Schoolhouse respondents were asked what they found to be the most challenging aspects of the programme. The most frequent response was that paperwork or administration for Digital Schoolhouse was often challenging. One respondent said: *'liaising with extremely busy teachers is always difficult… Getting data and feedback from teachers can be quite a laborious process'.* The administrative burden placed on schools was also highlighted as a challenge by the Digital Schoolhouse lesson observers, particularly during the organisation phase when trying to schedule workshops. One respondent said the project had demanded more resource in terms of staffing and physical space than had been advertised and believed the funding system penalised schools that complied with the original agreement. It was noted by one lesson observer that the lead teacher at one school felt that the Digital Schoolhouse administration was out of proportion to the aims of the programme; this, however, was not understood to be the perception of the departmental leader. Another teacher response focused on challenges with resources, as setting up Raspberry Pis takes a *'significant period of time'.* As mentioned above, pitching the lessons appropriately was also seen as a significant challenge.

1.2 Management and Delivery Processes

Overall organisation and delivery

Three Digital Schoolhouse teachers commented on the high quality of delivery staff at UKIE. One member of staff in particular was highlighted by all three of these respondents, who was described as *'very well organised'* and able to boost confidence by being available to provide extra support when needed. Similarly, one lesson observer commented that UKIE had been very successful in selecting the right teachers to participate in the Digital Schoolhouse.

Although they were not asked explicitly about the wider programme delivery, two primary school teachers made comments related to the ease of attending Digital Schoolhouse. One teacher said that it was 'great' that the Digital Schoolhouse provided minibus transport for attendees, because transport would have added to the costs of attending.

1.3 Future Sustainability

The DSH project supports a need amongst the creative technology industry to strengthen the talent pipeline and support future employment and growth. The project also meets the recommendations put forward by the NextGen skills report as well as several other recommendations highlighted in House of Lords Digital Skills[1] committee report and Nesta's Young Digital Makers.[2]

Ukie has put forward significant funds to contribute towards staffing the project in 2016. In addition four of the additional Digital Schoolhouses have committed to delivering the project between September 2015 to July 2016 regardless of funds available. New Digital Schoolhouses have also come on board either temporarily or for the entire academic year. The new Digital Schoolhouses joining us in September 2015 are:

1. Burntwood School, Wandsworth (autumn trial initially, reviewed January 2016)
2. Mount Carmel, Islington (autumn trial initially, reviewed January 2016)
3. Dover College, Kent
4. Tech City Aspirations Academy (workshops launch in January 2016)

[1] Make or Break: The UK's Digital Future, House of Lords Select Committee on Digital Skills, Report of Session 2014 – 2015

[2] Nesta – Young Digital Makers, Oliver Quinlan, March 2015

Tech City Aspirations Academy is a 6th form FE college that has agreed to pilot the DSH project by focusing on the transition from secondary to FE. During September to December 2015 we will be devising a bespoke training programme for the staff and 6th formers involved in the programme. These key personnel will delivery DSH workshops to visiting Key Stage 3 and Key Stage 4 students as part of their own enrichment programme.

Our collaboration with Tech City academy goes further with plans being put in place to organise the first ever DSH Conference in June 2016. The conference will follow the existing DSH model, designed and targeted towards pupils and students, with the visiting teachers learning alongside their learners. This is a unique opportunity to strengthen the connection between industry and education as well as continue to raise the profile of the Digital Schoolhouse. Currently funding and sponsorship models to allow us to run this event are being investigated.

We have also developed a body of expertise and resources, highly valued by schools. We aim to continue to expand this work by:

- Building our "Talking Digital…" video series
- Increasing our collaboration with partners to develop a wider range of resources being hosted on multiple platforms
- Contributing to national guidance documents supporting schools with embedding the new national curriculum.

An improved and invigorated PR strategy with established Digital Schoolhouse branding and associated conference appearances should help to improve the visibility of the brand as well as expand our reach nationally. Our aim is to bring a Digital Schoolhouse to 12 different games/technology regions across the UK over the next three years. An essential factor for this is significant funding to enable this to happen. We are currently investigating several options for continued funding and self-sustaining revenue streams. These include:

- Develop the 'adopt a Digital Schoolhouse' model allowing companies to sponsor a school to maintain an existing Digital Schoolhouse or establish a new one.
- Explore corporate/grant funding to secure funds to enable the planned expansion into 12 regional UK technology clusters
- Investigate delivery of payable training programme for national roll out. A pilot is currently planned in parternship with Albion Computers for 19/20 October 2015.
- Consultancy service to schools and other organisations
- Re-packaged Digital Schoolhouse curriculum resources to be made available in 1 hour lesson formats and sold on a not-for-profit basis.
- Running events such as the annual Digital Schoolhouse Conference.

12. Final Report Conclusion

Please provide key conclusions regarding your findings and any lessons learnt *(maximum 1,500 words)*.

Alongside overarching key conclusions, headings for this section should include:

Key findings for assessment of project impact

- *What outcomes does the evaluation suggest were achieved?*
- *What outcomes, if any, does the evaluation suggest were not achieved or partly achieved?*
- *What outcomes, if any, is there too little evidence to state whether they were achieved or not?*

Key lessons learnt for assessment of project delivery

- *What activities/approaches worked well?*
- *What activities/approaches worked less well?*
- *What difficulties were encountered in delivery and how could they be mitigated in the future?*
- *Were there any additional or unintended benefits (e.g. increases in student attendance as a result of an intervention aimed at teachers)?*

Informing future delivery

- *What should the project have done more of?*
- *What should the project have done less of?*
- *What recommendations would you have for other projects regarding scaling up and/ or replicating your project?*

Key Findings for assessment of Project Impact

Outcome: Increased [teacher] subject knowledge and greater awareness of subject specific teaching methods in new Computing Programme of Study such as algorithms, programming, hardware and networking and digital literacy.

- Outcome achieved - Although qualitative data was lacking for assessing impact on primary teachers (through lack of an established baseline measure), all evidence indicates that the teachers involved in the project found it useful.
  - Results clearly show that participation in the project has benefits for the teachers involved
  - Secondary teachers have shown significantly improved subject knowledge; particularly, in the areas of data representation and algorithms
  - Primary teachers have reported an increased understanding of the new computing curriculum and an awareness of new approaches and resources to teach computing

Outcome: Increased teacher confidence for all DSH teachers and participating primary school teachers

- Outcome achieved
  - Written feedback from lesson observers and self-evaluation forms indicates a positive impact from Digital Schoolhouse involvement on teacher confidence levels
  - Qualitative and quantitative results both show a significant increase in DSH teachers' confidence, particularly in the area of algorithms and data.

Outcome: Delivery of higher quality teaching including subject-focused and teaching methods

- Outcome partly achieved – although this is difficult to assess adequately
  - A wide range of curriculum resources were developed. Each pack of materials was mapped to the curriculum, cross-curricular and creative in its approach and attempted to use innovative techniques to teach computing. Almost all materials developed from September 2014 onwards also incorporated industry expertise.
  - Delivering unplugged activities to teach computing was a new pedagogical technique for the teachers involved.
  - All Digital Schoolhouses have reported to using and adapting the DSH materials for their own KS3 to KS5 students.
  - DSH materials have been widely accepted and are now hosted by the National STEM Centre elibrary and TES Resources (which has had over 3000 downloads since April 2015)

- Our innovative "Let's Doodle" workshop pack has been publicised as a model of good practice by the company 3Doodler and is now hosted on their site and shipped globally as part of their educational pack.
- Teachers have learnt new approaches to teaching computing through the Digital Schoolhouse, some of which are carried over to other curriculum areas such as literacy.
- Feedback from the independent observers indicates that while the workshops were consistently a positive experience for all involved, they were unsure about how many of the underlying deeper concepts had been truly understood by pupils.
- Consistent delivery of high quality teaching is an ongoing goal of the Digital Schoolhouse.

Outcome: increased educational attainment and progress in Computing

- Outcome achieved
  - Pupils demonstrated significant gains in educational attainment and progress in computing across all the areas measured
  - The greatest learning was observed in use of new terminology, coding and pupils being able to become digital makers
  - Results indicated the potential for long term impact. Pupils reported an increased interest in computers and a few had begun to consider it as an area in which they may like to work in the future.
  - While pupils consistently grasped new techniques, the learning of deeper underlying concepts was inconsistent (as reported by the independent observers). With improvements in the quality of teaching we aim to address this issue.

Outcome: Teaches/schools involved in intervention making greater use of networks, other schools and colleagues to improve subject knowledge and teaching practice

- Outcome achieved - -although it was not possible to gather any quantitative data to measure this
  - The greatest impact reported by all teachers involved in the project was the links and wider networks that were developed
  - Primary and secondary schools reported an improved primary to secondary pupil transition experience. This included:
    - Improved relationship between secondary and feeder primary schools
    - Pupils given a 'genuine' experience of secondary school life
    - Secondary's developed a greater understanding of the Key Stage 2 curricula
  - The Digital Schoolhouses were able to support primary schools with lesson planning
  - Participating secondary schools felt the participation within the project helped to raise their whole school profile amongst the community
  - Evidence of the impact of the DSH continuing beyond school. Several pupils indicated that they would share their learning with members of their family, and some

Key Lessons learnt for assessment of Project Delivery

What worked well:

1) The overall approach and method of delivery within the DSH works very well for both participating primary and secondary schools. The workshops are successful in engaging pupils, as well as having wider school impacts.

2) The sustained and personalised support provided by Digital Schoolhouse teachers post workshop helps to continue to inform delivery in primary schools with a view to embedding computing firmly within the school curricula.
3) Holding half termly meetings for DSH teachers to update progress and provide short bursts of training; followed up by interim electronic communication helps to keep the pace and momentum of the project going.
4) The observation process of the DSH teachers which begins with an informal observation in the autumn term and is followed by a more formal observation carried out by independent experts in the summer term.

What worked less well:

1) Organising large free CPD events. Attendance to these is low despite the high demand
2) Digital Schoolhouses were unable to deliver workshops around exam season (April to May) due to workload of managing their own exam classes.
3) The administration load of booking and customising workshops to meet the needs of the visiting primary schools proved to be quite burdensome for many DSH teachers.
4) Due to workload and time constraints DSH teachers were unsuccessful in chasing up responses to data collection methods, and as a result we were unable to successfully establish a baseline measure for primary school teachers.
5) The surveys used to measure pupil and primary teacher impact was quite complex and took a while to complete, this greatly affected our response rate

Informing Future Delivery

Recommendations going forward are:

1) Improve quality of teaching and learning in Digital Schoolhouse workshops. This can be done by:
    a. Improve Digital Schoolhouse teacher training by incorporating primary pedagogy training delivered by primary school experts.
    b. Introduce an interim observation/visit designed to see if teachers have built upon the feedback given in the initial informal observation.
2) Continue to monitor longer term impact of Digital Schoolhouse on pupils and teachers
3) Revise tools to monitor and assess impact of educational attainment on pupils. Ensure measurement tool is written using appropriate language and of a suitable length.
4) Revise tools to monitor and assess impact of Digital Schoolhouse on teacher knowledge and understanding and confidence in delivery with primary school teachers. Ensure the tool is easy to deliver, concisely devised and has clearer delivery strategies.

Appendices

A: Data Tables

Teacher Agency Requirements Data[3]

Range & Content	Average Change			% of Possible Movement		
	Overall	K&U	CinD	Overall	K&U	CinD
Average Overall	0.24	0.20	0.28	48%	52%	46%
Average: Algorithms	0.26	0.22	0.29	59%	71%	53%
Average: Programming & Development	0.19	0.15	0.23	28%	29%	26%
Average: Data & Data Protection	0.31	0.29	0.34	73%	82%	67%
Average: Computer Hardware & Processing	0.24	0.18	0.29	51%	50%	53%
Average: Communication & Networks	0.23	0.18	0.28	44%	44%	44%

1.3.1.1 Algorithms

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
A1	Explain that an algorithm is a precise way of solving a problem which can be followed by humans and computers.	0.12	0.12	0.11	63%	100%	44%
A2	Give examples of algorithms met in everyday life	0.19	0.12	0.25	100%	100%	100%
A3	Explain that computers need more precise instructions than humans and the need for precision to avoid errors.	0.18	0.12	0.23	72%	100%	62%
A4	Explain and show how algorithms can use selection (if), repetition (loops), procedures (sub-algorithms within an algorithm).	0.21	0.11	0.32	42%	44%	43%
A5	Explain the need for accuracy of algorithms.	0.18	0.12	0.23	72%	100%	62%
A6	Distinguish between an algorithm and the programs that implements that algorithm	0.43	0.37	0.48	86%	100%	77%
A7	Explain how the choice of an algorithm should be influenced by the data.	0.13	0.07	0.18	21%	14%	24%

[3] **K&U: Knowledge and understanding; CinD: Confidence in Delivery**

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
A8	Be able to explain and use several key algorithms (e.g. sorting, searching, shortest path).	0.12	0.19	0.05	19%	31%	8%
A9	Explain how algorithms can be improved, validated, tested and corrected.	0.30	0.25	0.33	68%	100%	53%
A10	Explain that a single problem could be solved by more than one algorithm.	0.29	0.23	0.33	58%	62%	53%
A11	Explain and show how different algorithms can have different performance characteristics for the same task.	0.58	0.58	0.58	67%	67%	67%
A12	Successfully apply algorithms in solving GCSE and A level type problems.	0.36	0.30	0.41	36%	34%	37%

1.3.1.2 Programming & Development

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
P1	Code competently in at least two programming languages, which may both be 'visual'; at least one of these must allow the use of programming concepts such as selection, repetition, procedures, variables and relational operators.	0.33	0.33	0.32	48%	53%	43%
P2	Explain and use programming concepts such as selection, repetition, procedures, variables, and relational operators.	0.14	0.08	0.19	28%	22%	31%
P3	Review and assess the quality of code. Find and correct errors in syntax and meaning.	0.12	0.21	0.04	19%	42%	5%
P4	Explain that computers are controlled by sequences of precise instructions known as programs.	-0.01	-0.02	-0.02	-8%	-17%	-17%
P5	Explain that computers follow instructions/ blindly; hence the need for care and precision.	-0.02	-0.02	-0.04	-11%	-17%	-16%
P6	Represent algorithmic steps in multiple programming languages (e.g. logo, scratch).	0.10	0.11	0.08	32%	44%	22%

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
P7	Explain how and use programs to simulate environments to test hypothesis.	0.33	0.33	0.33	53%	53%	53%
P8	Explain and show how programs can be planned, tested and corrected and documented.	0.02	-0.04	0.09	6%	-16%	24%
P9	Explain how HTML constructs the rendering of a web page.	0.23	0.12	0.32	52%	100%	43%
P10	Program competently in a least two programming languages, at least one of which must be 'textual'.	0.27	0.36	0.19	48%	72%	31%
P11	Explain and use programming concepts such as selection, repetition, procedures, variables, and relational operators.	0.19	0.08	0.30	31%	22%	34%
P12	Explain and use truth tables and Boolean valued variables.	0.13	0.21	0.05	23%	42%	8%
P13	Explain and use two-dimensional arrays (and higher).	0.26	0.14	0.37	22%	14%	27%
P14	Explain and use nested constructs (e.g. a loop that contains a conditional, and vice versa)	0.08	-0.09	0.25	9%	-15%	20%
P15	Explain the concept of procedures that call procedures.	0.34	0.16	0.51	30%	18%	37%
P16	Explain how low level languages work and when they are used, being able to give simple examples.	0.36	0.30	0.41	36%	34%	37%
P17	Explain that a program can be written to satisfy requirements and that they should be corrected if they do not meet these.	0.23	0.11	0.33	52%	44%	53%
P18	Successfully apply programming in solving Computing/Computer Science GCSE and A level type problems	0.35	0.29	0.41	33%	29%	37%

1.3.1.3 Data & Data Protection

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
D1	Explain how computers represent all data in binary, with a variety of examples: unsigned integers, text representation (e.g. ASCII), different sound file data/types, and different graphics data/file types.	0.25	0.25	0.25	100%	100%	100%
D2	Explain how the same binary data can be interpreted in different ways e.g. an 8-bit value could be a character or a number.	0.00	0.00	0.00	N/A	N/A	N/A
D3	Explain how the same information can be represented in a computer in a variety of ways e.g. sound as mp3 or MIDI.	0.43	0.37	0.48	86%	100%	77%
D4	Explain that data can have errors, how this might affect results and decisions based on the data and how errors can be reduced	0.24	0.25	0.24	77%	100%	63%
D5	Explain the need for and content of the Data Protection Act, Computer Misuse Act and Copyright legislation (and other relevant legislation).	0.06	0.00	0.13	100%	N/A	100%
D6	Explain the difference between data and information.	0.12	0.12	0.11	63%	100%	44%
D7	Explain the need for and use of hexadecimal, two's complement, signed integers, and string manipulation.	0.37	0.44	0.29	39%	51%	29%
D8	Explain the need for data compression, and be able to describe simple compression methods.	0.29	0.24	0.33	58%	63%	53%
D9	Explain the need for analogue to digital conversions and how this works.	0.71	0.71	0.71	71%	71%	71%
D10	Explain the limitations of using binary representations – e.g. rounding errors, sampling frequency and fractional numbers.	0.80	0.68	0.93	58%	54%	62%
D11	Explain how structured data can be represented in tables in a relational database, and simple database queries	0.19	0.12	0.25	100%	100%	100%

1.3.1.4 Computer Hardware & Processing

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
C1	Explain what a computer is and give examples of devices that include computers.	0.13	0.12	0.12	100%	100%	100%
C2	Explain and describe the key characteristics of basic computer architecture (eg CPU, memory, hard disk, mouse, display etc) .	0.00	0.00	0.00	N/A	N/A	N/A
C3	Explain why there are sometimes different operating systems and application software for the same hardware.	0.18	0.12	0.24	72%	100%	63%
C4	Explain and use common troubleshooting techniques.	0.48	0.48	0.46	70%	77%	61%
C5	Explain Moore's Law and multitasking by computers.	0.62	0.55	0.68	52%	49%	54%
C6	Discuss social and ethical issues raised by the role of computers in the world.	0.24	0.25	0.24	77%	100%	63%
C7	Explain the importance of human-computer interface design	0.30	0.23	0.36	68%	62%	72%
C8	Discuss career paths for those studying Computing.	0.24	0.25	0.23	77%	100%	62%
C9	Explain the use of logic gates and registers.	0.52	0.46	0.58	64%	61%	67%
C10	Explain Von Neumann architecture.	0.06	0.00	0.12	6%	0%	11%
C11	Explain the fetch-execute cycle.	0.04	-0.09	0.16	5%	-15%	18%
C12	Explain and use low level instruction sets and assembly code.	0.25	0.13	0.37	20%	12%	27%
C13	Explain what compilers and interpreters are and do and give some examples of when they are used.	0.07	-0.06	0.19	14%	-16%	31%
C14	Explain the main functions of operating systems.	0.21	0.08	0.33	42%	22%	53%

1.3.1.5 Communication & Networks

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD

Ref	Range & Content	Average Change			% of Possible Movement		
		Overall	K&U	CinD	Overall	K&U	CinD
I1	Explain what the World Wide Web and the Internet are, and the difference.	0.24	0.25	0.23	77%	100%	62%
I2	Outline the key features of the World Wide Web and their relationships– e.g. browsers, URLs, navigation methods	0.24	0.25	0.23	77%	100%	62%
I3	Outline how data are transported on the Internet, including packets and the notion of a protocol.	0.20	0.21	0.18	32%	42%	24%
I4	Explain the role of search engines and what happens when a user requests a web page in a browser.	0.01	-0.06	0.08	3%	-16%	22%
I5	Explain the technological perspective on safety and security.	0.17	0.11	0.24	55%	44%	63%
I6	Explain the concepts of: client/server models; MAC addresses, IP addresses and domain names; and cookies.	0.13	0.07	0.18	21%	14%	24%
I7	Explain a 'real protocol' e.g. using telnet to interact with an HTTP server.	0.55	0.41	0.68	46%	37%	54%
I8	Explain routing; redundancy and error correction; encryption and security.	0.31	0.19	0.43	38%	31%	43%

Appendix B: Impact: Detailed Findings

Teacher Outcome 1: Increased subject knowledge and greater awareness of subject specific teaching methods

Teaching Methods and Approaches

Several primary school teachers suggested that they had taken away new approaches to teaching computing from Digital Schoolhouse. One secondary teacher said she had learnt a variety of teaching strategies and methods, such as that there are '*lots of different ways of delivering a potentially dry topic in an interesting way*'. Two teachers commented positively on the fact that the course was not entirely computer-based, one adding that this '*showed me creative ways to teach programming without actually using a computer'*. Another Digital Schoolhouse teacher said many primary schools view the unplugged workshops as being particularly important, as schools find that the '*theory aspect is difficult to teach and then apply*'. Observers noted that Digital Schoolhouse teachers tended to spend less time on unplugged activities, however; teachers did not have time to cover all areas and computer-based activities tended to take precedence.

It was suggested by one teacher that the programme used by children at the workshop could be used in many other areas of the curriculum, such as literacy and topic work. Another teacher commented that it was helpful to see how a lesson on Scratch was taught. Lesson observations of Digital Schoolhouse teachers also included a number of positive remarks on their teaching approach. These included *'experimentation and problem solving encouraged through range of progressively more difficult tasks; supportive manner yet pupils still worked independently'*; *'very clear explanations and use of key vocabulary'* and, for two of the teachers, *'good use of questioning'*.

Subject and Curriculum Knowledge

Comments from teachers in this area related more to curriculum understanding than to subject knowledge. Primary school teachers frequently discussed the benefits of Digital Schoolhouse for their understanding of the new computing curriculum. Comments were consistently positive and often referred to school-level benefits: *'[the workshops] deepened our awareness of the new computing curriculum, ways it can be accessed'* and '[the workshops] r*aised awareness in the school for Scratch and other aspects of computing curriculum'.* The lesson observer for one school said the primary teacher attending the workshop had taken the initiative to intervene in the lesson in order to change activities after witnessing that some pupils were struggling to grasp the content. Although comments about the new computing curriculum were more frequent among primary school respondents, one Digital Schoolhouse teacher noted that *'training days at Digital Schoolhouse HQ have helped to clarify my pedagogical approach to the new curriculum'*. Another respondent from a secondary school said computing teachers at the school had benefitted from *'timely specialist in-service training*' at a time where considerable changes to the curriculum were occurring.

Survey responses indicate a positive change in secondary teachers' knowledge and understanding following their Digital Schoolhouse involvement, with an average absolute difference of 0.20. This change represents 52% of the overall movement possible. The greatest change can be observed in terms of data & data protection, followed by algorithms. Significant differences in teachers' knowledge and understanding can also be observed in the areas of computing hardware and processing. For communication and networks, the average change is mixed, and the lowest degree of change can be observed in the area of programming & development.

In 21 of the 63 areas of specific computer science content about which teachers were surveyed, teachers rated their knowledge and understanding following their Digital Schoolhouse involvement using the highest possible score, most notably in the areas of data & data protection (as noted below), algorithms, and computing hardware and processing. This finding is significant and suggest that teachers' needs have been fully met in one third of all areas surveyed. No change was possible in three areas of content, however, as teachers rated their abilities using the highest possible score prior to their Digital Schoolhouse involvement; in all three areas, these scores were sustained. In another seven areas, a negative change can be observed before and after the Digital Schoolhouse involvement. It is worth nothing, however, that these findings are likely to have been affected by the small number of respondents to this questionnaire and should be interpreted with caution.

Data & Data Protection

In terms of the five key themes in which DHS teachers were assessed, the most significant change was observed in the area of teachers' knowledge and understanding of data and data protection; this change appears significant both in absolute and relative terms. The overall difference in teachers' reported knowledge and understanding of data & data protection before and after DHS involvement is 0.29; this represents 82% of the change possible. For specific content, the greatest change in teachers' knowledge and understanding that can be observed is in explaining the need for analogue to digital conversions and how this works in practice (ref. D9), with an overall change of 0.71 representing 71% of possible movement. There is also a large difference in teachers' reported understanding of ways in which the limitations of using binary representations can be explained (ref. D10); this difference is particularly noteworthy, as it was the area with the lowest reported knowledge and understanding among teachers prior to DHS involvement. The overall change in this area following DHS involvement is 0.68, comprising 54% of movement possible. While the difference in teachers' understanding appears to be less significant in explaining the difference between data and information (ref. D6) and explaining the difference in how structures data can be represented in tables in a relational database (ref. D11), with an overall change of 0.12 in both areas, it is still significant from a relative perspective as it accounts for 100% of the movement possible.

Algorithms

There appears to be a positive difference in teachers' knowledge and understanding of algorithms, with an overall change of 0.22 following their participation in DHS. In relative terms, this is a significant difference, as it represents 71% of possible movement. For specific content, the greatest difference observed is in teachers' understanding in terms of explaining and showing how different algorithms can have different performance characteristics for the same task (ref. A11). The overall change in this area is 0.58, accounting for 67% of the possible movement. In six other areas, including the distinction between an algorithm and the program that implements that algorithm, the change in teachers' knowledge and understanding represents 100% of the change possible.

Computing Hardware & Processing

Teachers' levels of knowledge and understanding of computing hardware and processing appear to have changed in certain areas. The overall change following DHS involvement is 0.18, representing 50% of the change possible. While this change is significant from a relative perspective, it is more limited than in other areas and there are great variances in the degree of change observed with regards to different content areas. A positive difference in teachers' knowledge and understanding of computing hardware and processing can be observed in five individual areas of content, particularly with regards to explaining and using common troubleshooting techniques (ref. C4). The overall change in this area is 0.48, comprising 77% of possible movement.

Communication & Networks

For communication & networks, the change in teachers' knowledge and understanding following DHS engagement is mixed. The overall change for this theme is 0.18, comprising 44% of the change possible. There are great variances in the degree of change observed for the different areas of content. In three individual content areas, there is a small or negative change before and after DHS involvement. However, it is noteworthy that teachers reported high levels of knowledge and understanding of communication & networks prior to DHS involvement in most areas surveyed, except for explaining a 'real protocol', e.g. using telnet to interact with an HTTP server (ref. I7). Teachers' levels of understanding in this area prior to DHS involvement is among the lowest observed for all areas surveyed. The overall change in this area following their DHS involvement is 0.41, representing 37% of possible movement. In two further areas, namely explaining what the World Wide Web and the Internet are (ref. I1) and outlining the key features of the World Wide Web and their relationships (ref. I2), the change in teachers' knowledge and understanding represent 100% of the change possible.

Programming & Development

Teachers' understanding of programming & development is the area where the least change can be observed following participation in DHS. The average change for this theme is 0.15, representing 29% of possible movement. In many areas, the absolute and relative change observed is considered to be too small to suggest a real difference in teachers' knowledge and understanding. There is also a negative change observed in four additional areas. However, as noted previously, findings are likely affected by the very small number of survey respondents and should be interpreted with caution. The most significant change observed is in teachers' understanding in programming competently in two programming languages, one of which is textual (ref. P10). The average change following DHS involvement in this area is 0.36, comprising 72% of possible movement. In one other area, namely explaining how HTML constructs the rendering of a web page (ref. P9), the observed change in teachers' knowledge and understanding represents 100% of the movement possible; the absolute change observed following DHS involvement in this area is 0.12.

Teacher Outcome 2: Increased teacher confidence for all Digital Schoolhouse teachers and participating primary teachers

When asked about impact of the programme on their teaching, Digital Schoolhouse respondents frequently highlighted an increase in confidence as a key area of impact. Areas in which teachers felt they had become more confident included using particular resources (*'I am far more confident with activities (unplugged*)', as well as in delivering lessons to younger pupils. Digital Schoolhouse had made one teacher more confident using computer science in Key Stage 3.

Primary school teachers were less likely to mention explicitly an increase in confidence when discussing the benefits of Digital Schoolhouse. Given that teachers were not asked directly about confidence levels, however, this does does not necessarily mean that the confidence levels of the teachers did not increase. The one teacher who did mention confidence said the following: *'training really helped develop my own confidence (as well as the children's) in using Scratch'*.

Survey responses from secondary teachers indicate a positive change in confidence in delivery following Digital Schoolhouse participation. The change in teachers' confidence is more significant than that of their knowledge and understanding, with an average difference of 0.28 before and after their engagement with the Digital Schoolhouse. In relative terms, this represents 46% of the overall movement possible. Similar to findings in the area of knowledge and understanding, the greatest change in teachers' confidence in delivery can be observed in the areas of data and data protection, and algorithms. Significant differences also emerge in terms of computing hardware and processing, and communication and networks. Again, teachers' confidence in programming & development is the area in which the least degree of change can be observed following Digital Schoolhouse involvement.

Following their Digital Schoolhouse participation, teachers rated their confidence in delivery using the highest possible score in seven of the 63 areas of content in which they were assessed. This suggests that teachers' needs were fully met in approximately 11% of areas surveyed. While this is significantly lower than in the area of knowledge and understanding, it should also be noted as being affected by lower levels of confidence among teachers prior to their participation in the Digital Schoolhouse.

Teachers rated their confidence in delivery prior to Digital Schoolhouse involvement using the highest possible score in two content areas; both scores have been sustained following their workshop participation. A negative change can be observed in another two areas; as previously mentioned, however, the small number of respondents to the questionnaire are likely to have affected findings.

Data & Data Protection

The change in teachers' confidence in delivery for data & data protection is the most significant of the five key themes in which teachers were assessed. The overall difference in teachers' reported confidence in delivery for data and data protection before and after DHS involvement is 0.34, comprising 67% of the movement possible. For specific content areas, the greatest difference observed is in teachers' confidence in explaining the limitations of using binary representation (ref. D10); this was also the area with the lowest reported confidence among teachers prior to DHS involvement. The change in teachers' confidence in this area before and after DHS involvement is 0.93, which represents 62% of the change possible. Significant differences can also be observed in terms of teachers' confidence in explaining the need for analogue to digital conversions and how this works (ref. D9) and explaining how the same information can be represented in a computer in a variety of ways (ref. D3). The average change in these two areas is 0.71 and 0.48 respectively, which represents 71% and 77% of the movement possible. In a further three areas, namely explaining how computers represent all data in binary (ref. D1), explaining how structured data can be represented in tables in a relational database (ref. D11) and explaining the need for and content of the Data Protection Act, Computer Misuse Act and Copyright legislation (ref. D5) the change represents 100% of movement possible.

Algorithms

There is a significant difference in teachers' confidence in delivery in algorithms in some areas surveyed. The overall difference in teachers' confidence is 0.29, representing 53% of the change possible. The greatest observable change is in terms of teachers' confidence in explaining and showing how different algorithms can have different performance characteristics for the same task (ref. A11), with an average change of 0.58 representing 67% of the movement possible. Positive change can also be observed in teachers' levels of confidence in distinguishing between an algorithm and the programs that implement that algorithm (ref. A6), and giving examples of algorithms in everyday life (ref. A2). The average change in these two areas is 0.48 and 0.25 respectively, which accounts for 77% and 100% of the change possible.

Computing Hardware & Processing

The overall change in terms of teachers' confidence in delivery in computing hardware & processing is similar to that in the area of algorithms, with the average difference for this theme being 0.29 and representing 53% of the change possible. The greatest difference can be observed for teachers' confidence in explaining the use of logic gates and registers (ref. C9). The absolute change following DHS involvement in this area is 0.58, which accounts for 67% of the movement possible. A smaller but nevertheless noticeable change is also observable in three other areas, including teachers' confidence in explaining Moore's Law and multitasking by computers (ref. C5), explaining and using common troubleshooting techniques (ref. C4), and explaining the importance of human-computer interface design (ref. C7). The absolute change for these three areas is 0.68, 0.46 and 0.36, respectively. In relative terms, these differences represent 54%, 61% and 72% of the overall change possible, indicating some increase in teachers' confidence.

Communication & Networks

The change in teachers' confidence in communication and networks following DHS involvement is varied. In overall terms, the average change from before and after DHS engagement is 0.28, which accounts for 44% of the movement possible. The greatest observable change is in teachers' confidence in explaining a 'real protocol', e.g. using telnet to interact with an HTTP server (ref. I7). The absolute change in this area is 0.68, which accounts for 54% of possible movement. A small change can be observed for most other areas in which teachers were assessed, except in three areas where the change is considered too small to indicate a meaningful difference in teachers' confidence; again, findings are likely to have been influenced by the small sample size for this survey.

Programming & Development

Teachers' levels of confidence in programming & development is, again, the area in which the least change can be observed following participation in DHS. In absolute terms, the change in teachers' confidence for this theme is slightly higher compared to that of their knowledge and understanding, with an average difference of 0.23. In relative terms, however, the change would appear less significant compared to that of teachers' knowledge and understanding, representing 26% of the movement possible. The difference observed in most areas is considered to be too limited to indicate a meaningful change in teachers' confidence. The greatest change can be observed for teachers' confidence in explaining the concept of procedures that call procedures (ref. P15), with an average difference of 0.51 before and after DHS involvement. However, when considered from both an absolute and a relative perspective, this change is quite small in comparison to other areas and themes, representing just 37% of the movement possible.

Pupil Outcome: Increased educational attainment and progress in computing

Overall Impact

Primary school teachers were particularly positive when discussing the impact of Digital Schoolhouse on their pupils. Teachers said they observed a variety of benefits of the workshops for their pupils. These included seeing the pupils *'realise the importance that computing has for them and their future'*, allowing pupils to experience resources and technologies not usually available to them and increased confidence and motivation. Teachers from one primary school were positive about the progress their pupils were making and were clear that the Digital Schoolhouse sessions were '*making a positive difference which they could see reflected in their assessments*'. Teachers from this school saw the input from the partner secondary school as offering '*extension and development for pupils which they lacked in-house*'. Another teacher said the workshop had enabled pupils to realise the importance of planning and they had quickly picked up the '*skills of creating some basic to complex animations*'.

The Digital Schoolhouse appeared to be a good learning experience for the majority of pupils that participated. When asked to comment about their experience of the day, a large group of pupils mentioned that they had learned *'a lot'* or *'loads'*.

New Learning

According to written feedback for one school, the key points of learning for pupils include computational thinking, programming, creativity and exploration. Pupils were asked whether they had learned anything new, to which the most common response was that they had learned new computer words and their meaning, such as 'parameter', 'sequence', 'condition' and 'command'. A large number of pupils also mentioned that they had learned how to code and programme on a computer, and two pupils mentioned that they had learned that coding can be fun: *'it was actually rather fun to know how to code because at the beginning I found it really hard but now I find it easy'*. A smaller number of pupils mentioned that they had learned how to make their own game or world. One pupil commented on having learned that programming computers *'isn't as hard as it looks'*, while another said the workshop had taught them that computing requires *'practice and hard work'*. In addition to the feedback forms, a large number of pupils used the score cards as an opportunity to talk about what they had learned at the workshop. Ten pupils mentioned that they had learned new techniques on Scratch. Only two pupils stated that they had not learned anything new.

The Digital Schoolhouse lesson observes noted that while it was clear that the workshop had been a positive experience for pupils and that children had left feeling enthused, they were unsure how many of the underlying concepts had been understood. It was noted in the lesson observation form for one school that the progress of children had been '*consistently strong*', with evidence indicating that they achieve well over time. However, while the more advanced students were able to apply their learning to different contexts and problems, progress was noted to be varied as some children were not reaching their full potential. Lesson observers said some secondary teachers were unable to put the lesson contents into the context of a primary setting and, thus, certain parts were either too advanced or delivered too fast for pupils to comprehend fully. An improvement of subject knowledge was seen as possible, however, where lesson planning was delivered at the right level for pupils. Greater emphasis on unplugged activities was also suggested by the lesson observers as a way to increase understanding and develop computational thinking among pupils.

Increased Desire to Use Computers

To the question of whether the participation in DHS had made them want to do more with computers, all but two pupils responded positively. Reasons for wanting to increase computer use included putting into practice the new skills that had been learned; and feeling more confident and comfortable with computers. One pupil reported an increased desire to use computers due to it being *'really interesting and it makes me feel good when I do well. Best of all, it's bags of fun.'* A secondary school teacher said some pupils were interested in buying some of the resources used during the workshop as their next birthday present. One pupil, for example, commented: '*I thought the Arduino were so cool, I wish I had one of my own to play with at home'*. Of the two pupils who responded negatively to the question of whether the workshop had made them want to do more with computers, one explained: *'I have never really liked or got the hang of using computers'*.

Impact on Engagement

All but one of the teachers made positive comments about the children's experience of the workshops, describing the pupil's experiences using terms such as '*engaged', 'enjoyed'* or *'excited'*. One primary teacher said students had been '*totally immersed in their task*'. Pupils were also overwhelmingly positive about their experience at DHS, with many describing their experience of the day as fun. Many pupils also described the day as being '*awesome'*, '*amazing*', or '*cool*', and some said they thought the workshop was interesting. Only two pupils, both from Burster Wood Primary School, said that they found some aspects of the workshop to be boring. Another pupil, from Yerbury Primary School, commented: '*first I found it hard and boring but after learning and listening it was the best*'. Being exposed to a new experience and learning new things made the workshop enjoyable and fun according to five pupils. As one pupil commented: *'we're learning about new things and having more experience of the world'*. One student said the workshop was fun because the coding games were challenging, whereas another pupil commented that they had fun without realising they were being educated.

Unanticipated Impact

The potential for possible long-term impact in the area of employment was suggested by a few of the pupils' feedback. For example, when asked to summarise the experience of the day, one pupil replied: *'seriously consider as a job'*. To the question of whether the workshop had made pupils more interested in computers, another said: *'Yes definitely. Want to work in media when older.'*

The Digital Schoolhouse workshops appeared also to have had a positive impact on the Year 9 buddies participating. According to one lesson observer, buddies from one school *'clearly enjoyed participating and it helped to develop their peer tutoring schools and other social skills*'. One Digital Schoolhouse teacher said that the 'buddy system' element of the programme had been particularly effective for special needs pupils.

Wider System Outcome: Teachers/schools involved in intervention make greater use of networks

The majority of Digital Schoolhouse feedback respondents identified links with other schools as a key benefit of the programme. One respondent stated that the project had helped the secondary school forge close links with feeder primary schools in the area. Another respondent explicitly stated that the links created with primary schools and fellow colleagues had been the main benefit of the programme (*'traditional support/resources have been a bonus'*); another that the prospect of building relationships had been one of the key motivations for getting involved in the programme. The networks formed through the project were reported to have a variety of benefits. One respondent said that the Digital Schoolhouse served as an *'invaluable hub for new technology'*.

Unanticipated Impacts

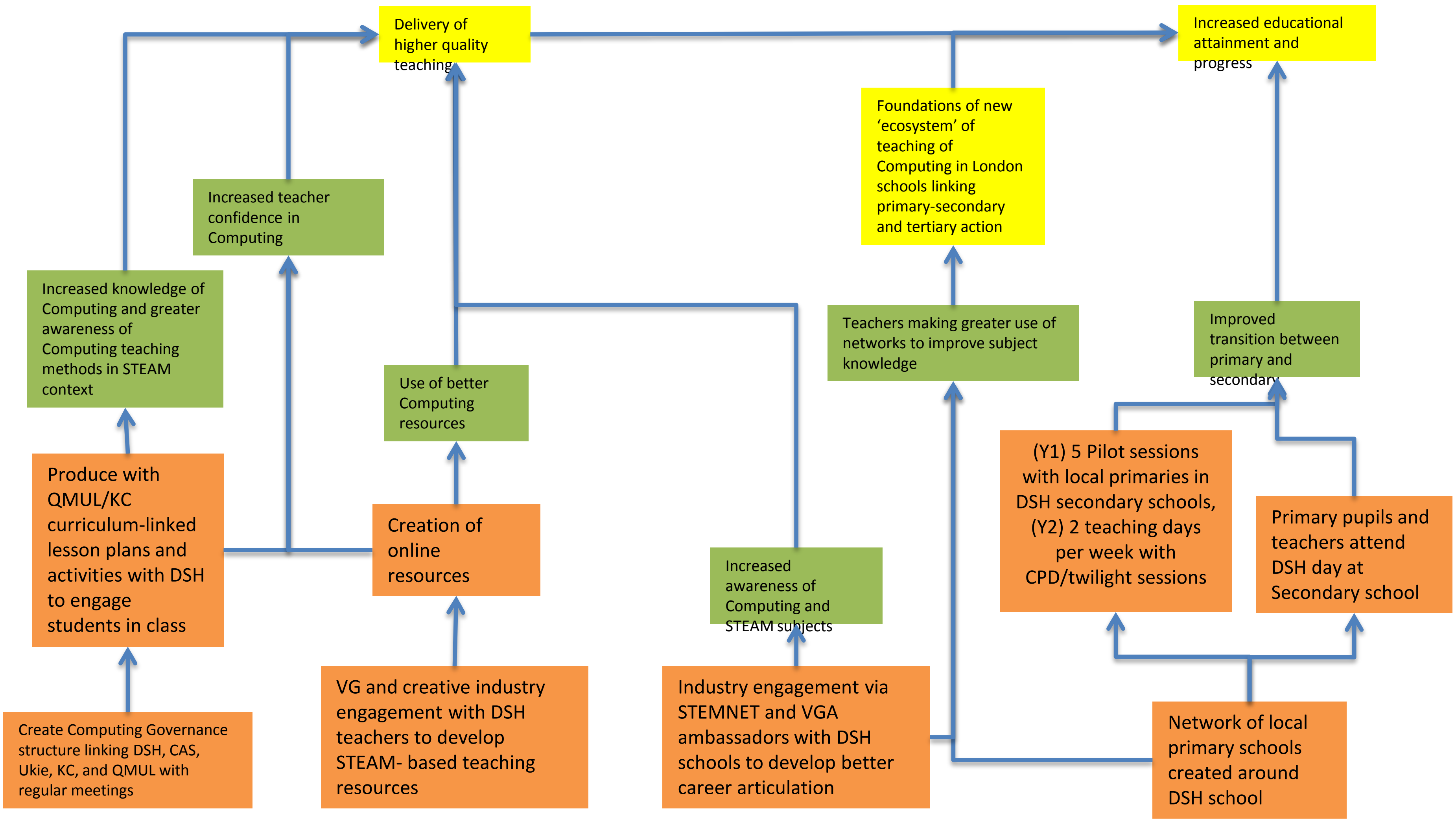
Several areas of unexpected impact of the programme were identified by Digital Schoolhouse teachers. Perceived benefits of the programme for individual schools included raising the profile of the school and providing an opportunity for community outreach. One respondent, representing a girls' school, said that the programme had helped the school *'to encourage girls into computing'*. Another respondent, from a secondary school, said the project had complimented the school's aim of inspiring an interest in programming among girls.

A primary school teacher discussed the impact of Digital Schoolhouse workshops on school and lesson planning. A workshop exercise which assessed children's levels of prior learning *'highlighted what the children need to know/identified gaps that can be targeted in our planning',* the teacher said. A headteacher from one secondary school said participation in the Digital Schoolhouse project had considerably raised the school's understanding of the new computing curriculum and familiarised the school with the expectations in Key Stage 2.

There is evidence from both pupils and teachers that the Digital SchoolHouse may support a better transition from primary to secondary education, as well as better relationships between secondary schools and their feeder primaries. One pupil commented, for example, that the workshop *'gave us a taster of what secondary life is going to be like'*. Another said that a favourite part of the day was the opportunity to look around the school, as he/she might be attending it in the future. In a booklet containing thank you cards from pupils at Upton Primary School to teachers at Townley Grammar School, the majority of pupils wrote that they wanted to go or were thinking of going to Townley in the future. A Digital Schoolhouse teacher said that they expected the programme to give primary school pupils a 'flying start' as they transition between primary school and secondary school. A primary school teacher said that it was good for the school's year 5 to see some year 7 helpers, highlighting the link between Digital Schoolhouse and the transition between primary and secondary school.

The impact on transition between primary and secondary school was also noted as being 'very significant' and 'very successful' by the Digital Schoolhouse lesson observers. One observer said that transition, for both pupils and sending/receiving schools, was the main reason for teachers participating in the programme. The observers also commented that activities designed to promote transition could often feel fake and were usually very difficult to organise and implement, whereas the Digital Schoolhouse handled this experience in a way that felt more normal.

In some cases, there was evidence that the impact of Digital Schoolhouse extended beyond the school. Three pupils said that they would show what they had learned to members of their family. As one pupil commented: *'I could show my sister how to do this and then we could both play together'*. This was echoed in the comments of one primary school teacher who said that the workshop fostered collaboration between pupils, and that the pupils who attended the workshop *'can be ambassadors for others'*.


Delivery of higher quality teaching
Increased educational attainment and progress
Foundations of new 'ecosystem' of teaching of Computing in London schools linking primary-secondary and tertiary action
Increased teacher confidence in Computing
Increased knowledge of Computing and greater awareness of Computing teaching methods in STEAM context
Use of better Computing resources
Teachers making greater use of networks to improve subject knowledge
Improved transition between primary and secondary
Produce with QMUL/KC curriculum-linked lesson plans and activities with DSH to engage students in class
Creation of online resources
(Y1) 5 Pilot sessions with local primaries in DSH secondary schools, (Y2) 2 teaching days per week with CPD/twilight sessions
Primary pupils and teachers attend DSH day at Secondary school
Increased awareness of Computing and STEAM subjects
Create Computing Governance structure linking DSH, CAS, Ukie, KC, and QMUL with regular meetings
VG and creative industry engagement with DSH teachers to develop STEAM- based teaching resources
Industry engagement via STEMNET and VGA ambassadors with DSH schools to develop better career articulation
Network of local primary schools created around DSH school

UKIE Evaluation Framework

This document is your tailored Evaluation Framework.

It uses the same template Framework that can be found in Appendix 2 of the LSEF Evaluation Toolkit. However, this Framework contains tailored recommendations regarding which outcomes and indicators your programme should evaluate. Outcomes and indicators marked with a tick are recommended for your programme:

☑ Outcome, indicator or data collection method **recommended**

☐ Outcome, indicator of data collection method **not required**

Recommendations have been made in light of your programme aims and methodology in order to ensure that programmes are able to confidently demonstrate the extent of their impact.

For more information, or if you have any questions regarding your Evaluation Framework please contact: educationprogramme@london.gov.uk

	Outcomes	Indicators	Baseline data collection[i]	Impact data collection[ii]
Teacher outcomes **Sub Groups** As part of establishing the baseline, the characteristics of the eligible cohort should be analysed across the following sub groups: ☑ NQTs ☑ 3 years + ☑ Primary/ secondary ☑ Other (project specific) These should be expressed as a % of the whole group. **Churn** Throughout the programme thorough records of any "churn" of teachers leaving or joining the intervention group must be kept. In order to do this records must be kept of: ☑ Unique teacher identifier ☑ Engagement date ☑ Disengagement date and reason	☑ Increased subject knowledge and greater awareness of subject specific teaching methods in new Computing Programme of Study such as algorithms, programming, hardware and networking and digital literacy.	☑ Increased DSH teacher scores in subject knowledge teaching method tests[iii] Tests to be taken by all teachers involved in the intervention (DSH). Computing at School is developing the test for the DfE funded CAS Master Teachers Level 1. This will be the baseline document	☑ Scores collected for individual DSH teachers from pre intervention subject knowledge/ teaching method tests in April 14 and again in Oct 14 when DSH teachers are in post and after the SKE.	Scores collected for individual DSH teachers from subject knowledge/ teaching method tests after Yr1 and Yr2 of intervention, in July14 and again in July 2015 when DSH teachers are in post and after the SKE.
	☑ Increased teacher confidence for all DSH teachers and participating primary school teachers	☑ Increased teacher scores in confidence surveys for all DSH teachers and participating primary school teachers. Based on 'My Science' and existing CAS surveys.	☑ Scores collected for individual teachers from pre-intervention confidence surveys in September 2014. Sample CAS survey attached.	☑ Scores collected for individual teachers from post intervention confidence surveys after Yr1 and Yr2 of intervention ☑ Interviews/ focus group of sample of survey respondents to moderate survey findings ☑ Survey of all participating teachers (a) expectation 80% feedback on the day; (b) 20% completion on the 10 week impact survey (c) interview of half of impact survey respondents.

	Outcomes	Indicators	Baseline data collection[i]	Impact data collection[ii]
	☑ Delivery of higher quality teaching and teaching methods in Computing Programme of Study	☑ Assessment of teaching quality over time Observations to be conducted for all DSH teachers by Programme Director as part of quality assurance programme. With 30% lessons to be independently moderated[iv] by our external evaluator. ☑ Pupil attainment ☑ Pupil engagement with subject at primary school	☑ Schools records of quality of teaching in ICT/Computing in participating Primary schools. ☑ Pupil attainment ☑ Pupil engagement at primary school based on pre- and post- DSH survey	☑ Standards collected for individual teachers from observations after Yr1 and Yr2 of intervention
	☑ Use of better subject-specific resources for new Computing Programme of Study	☑ Development of better subject specific resources ☑ Uptake of new resources	☑ Audit/sample scrutiny of existing subject specific resources being used by Programme Director following discussions with participating schools. ☑ Launch date of new resources	☑ We will measure use of new Computing resources in lessons. Resources for lessons will be mapped with level-descriptors. (a) Usage analysed against performance in observed lessons. (b) Also number of downloads from Network of Excellence CAS website and existing online ratings system for resources.

	Outcomes	Indicators	Baseline data collection[i]	Impact data collection[ii]
Pupil outcomes **Sub Groups** The characteristics of the eligible cohort should be analysed across the following sub groups: ☑ LAC continuously for 6 months+ ☑ FSM ☑ FSM at any time during last 6 years* ☑ Disadvantaged pupils ☑ EAL ☑ Gender ☑ Ethnicity ☑ Statement of SEN or supported at School Action Plus ☑ Started respective Key Stage below expected level, at expected level, above expected level All characteristics should be captured as part of establishing the baseline and data should be collected to enable all outcomes to be analysed across these sub groups. **Churn** Throughout the programme thorough records of any "churn" of pupils leaving or joining the intervention group must be kept. In order to do this records must be kept of: ☑ Unique pupil identifier ☑ Engagement date ☑ Disengagement date and reason **Pupil outcomes continued…**	☑ Increased educational attainment and progress in Computing.	☑ Increased attainment (levels and sub levels at KS1-3) compared against a comparison group[iv] - from the same school. The project will be using progression Pathways published by CAS. http://community.computingatschool.org.uk/resources/1692	☑ Intervention group: assessed level on entry to the programme ☑ Comparison group: selected from non-DSH class in participating school. ☑ Trend data[v]: Actual attainment (levels/grades) for the 3 previous year groups	☑ Intervention group: actual pupil attainment levels after Y1 and Y2 of intervention ☑ Comparison group: actual pupil attainment levels after Y1 and Y2 of intervention Attainment will be based on teacher assessments. Sample of pupil assessments will be independently moderated[iv] by the external evaluator.
		☑ Increased levels of progress achieving higher point scores than expected by teacher, and then against a comparison group[vi]	☑ Intervention group: estimated point score without intervention (for Y1 and Y2 of programme) ☑ Comparison group: estimated point score without intervention (for Y1 and Y as above)	☑ Intervention group: difference between actual attainment and expected attainment (without intervention) ☑ Comparison group: difference between actual attainment and expected attainment (without intervention)
		☑ Reduced gap between attainment of different sub-groups/disadvantaged groups of pupils (e.g. FSM, LAC, by gender etc.) compared against a comparison group[vi]	☑ Intervention group: in house % points gaps between relative attainment of sub groups pre intervention and for 3 years previous ☑ Comparison group: in house % points gaps between relative attainment of sub groups pre intervention and for 3 years previous ☑ Trend data: in house % points gaps between relative attainment of sub groups for the 3previous year groups	☑ Intervention group: in house % points gaps between relative performance of sub groups after Year 1 and 2 of intervention ☑ Comparison group: in house % points gaps between relative performance of sub groups after Year 1 and 2 of intervention

	Outcomes	Indicators	Baseline data collection[i]	Impact data collection[ii]
School system outcomes	☑ Teachers/ schools **involved in intervention** making greater use of networks, other schools and colleagues to improve subject knowledge and teaching practice	☑ Increased attendance at CAS hub meetings by primary school teachers; increased attendance at existing CAS meetings, where already in existence and creation of new CAS hubs where not. Attendance by teachers at educational meetings organised by industry, including games industry.	☑ Numbers and profile of teachers attending numbers of network meetings, conferences, taking advanced courses etc. over 12 months previous to the intervention. Information to be gathered via existing CAS community network/Network of Excellence and reported to Project Board on quarterly basis.	☑ Numbers and profile of teachers attending numbers of network meetings, conferences etc. over Y1 and Y2 of the intervention Information to be gathered via existing CAS community network/Network of Excellence and reported to Project Board on quarterly basis.

[i] **Baseline data** should be captured just before engagement with the programme intervention. Programmes may therefore simply require one round of baseline data collection at the beginning of the programme. However, where the programme implements a staggered engagement of groups, a baseline will need to be conducted for each group just before they engage with the intervention.
[ii] **Impact data** should be analysed after Y1 and Y2 of the intervention as a minimum.
[iii] **Independent reviewers/ moderators** of resources, teacher tests and observations and pupil attainment should be agreed with the GLA.
[iv] **Comparison groups** could be a randomised control group (preferred if possible), such as a cluster randomisation, or a matched comparison group. It should be the same size as the intervention group and should measure all outcomes in the same way. Please see the Glossary for additional explanation of comparison groups.
[v] **Trend data** is designed to show results of the intervention groups in the context of year on year fluctuation in attainment of different year groups. Trend data should be collected for the 3 previous year groups for the 3 years previous to the age of the intervention group as well as the 2 years when the cohort was the same age as the intervention group. I.e. of the programme is looking at year 6 and 7 starting with year 6s in year 1 then trend data should be collected for the current year 7, 8 and 9 for the years when they were in year 3, 4, 5, 6 and 7. This can then be compared to intervention and comparison group data which will also be collected for 3 years previous to the intervention (years 3-5) as well as the intervention (years 6-7).