In the thick of it!

Getting Ready

1. Stimulus

1. The traditional method of recording science investigations in primary school is writing. It is my experience that this poses a barrier to quality science learning, especially with children at FS and KS1. The 'slog' of 'writing up' investigations restricts the *flow* of an investigation when the children are 'in the thick of it'. This 'in the thick of it' point is the key time in investigations - children are immersed in an activity and 'real' contextual learning is taking place. As a teacher, this is the key time to be capturing the skills, knowledge, language and understanding that children have developed.

2. Assessment and assessments ***for*** learning in particular in Science, especially with 'Working Scientifically' is an ongoing issue across primary school, due to the continued lack of government guidance. Children's ability to **record** key information impact teachers' ability to assess fully and accurately as this is often the only 'window' to their learning. Although there has been greater emphasis on teacher assessment though observation in science, there relies a dominance on evidence being written down or recorded, often undertaken after the investigation itself. Of course, this in turn impacts on planning and we ask whether teachers are catering adequately for children's individual needs if their assessments of children's is not as rich as possibly they could be.

3. During class work, practitioners may be able to produce high quality assessments/ observations of some of the children, some of the time. The logistics of carefully **observing** all groups of children working scientifically when 'in the thick of it' are extremely challenging if not impossible. Further, if assessing based upon **recorded work** from the session for instance at KS1 there are often issues with the quality of the recorded work simply due to the ability of the children to write/record to an adequate level. We aim to explore this from both a KS1 and KS2 perspective.

2. Hypothesis

Our hunch is that if we can broaden the pallet of recording methods, by incorporating the use of digital media, we will better:

1. encourage learning in science through promoting collaboration, discussion, argumentation, explanation and justification of ideas between children and their teachers.
2. capture the use of scientific vocabulary, use of skills and knowledge and seek to find out how children apply science and understand the implications of it in a wider context
3. able to give accurate and timely teacher assessment so that teachers are able to assess and track **individual** learning and therefore to set appropriate challenging, progressive and simulating learning objectives for children.

3. Research

What does the research say? What do others in my school know about this?

The National curriculum articulates the need for children to 'work scientifically' and learn basic Science enquiry skills at KS1.

> *'Working scientifically' specifies the understanding of the nature, processes and methods of science for each year group. It should not be taught as a separate strand. The notes and guidance give examples of how 'working scientifically' might be embedded within the content of biology, chemistry and physics, focusing on the key features of scientific enquiry, so that pupils learn to use a variety of approaches to answer relevant scientific questions.*
> DfE,

Working scientifically clearly lies at the core of learning in the national curriculum. These key aims of Science at Primary level are also well documented *beyond* the national curriculum.

> *One of the key aims of science at this stage is to enable children to 'work scientifically', something that cannot be assessed by external written tests alone. Teachers can observe pupils when engaged in science investigations and ascertain their understanding by listening, questioning and looking at their work.*
> Wynne Harlen, 2012

Wynne Harlen points out the assessment methods that teachers use to ascertain understanding too (observing, listening, questioning and looking at their work). She points out that alongside the need for children to develop skills, lies a need to assess accurately.

> *Assessment has a strong influence on curriculum and pedagogy, making it **essential** that there is a correspondence between what is intended to be learned and what is assessed*
>
> *Wynne Harlen, 2012*

Ofsted reflected this need for assessment in their 'Successful Science' publication (2013) stating that the highest performing schools in science were setting 'challenging individual targets in science'. The report stated that in successful schools there was a greater 'focus on the performance of **individuals** with effective monitoring and tracking systems that allowed their progress to be identified.' Also 'In a welcome development, a smaller proportion of schools in this survey compared only the performance of classes and cohorts rather than individuals. *The increased focus on individuals' performance and that of different groups provided a good basis for intervention with them and promoted progress more effectively*.'

Further, Ofsted continued to champion the value of individual assessments. In the most successful schools,

> *'More rigorous monitoring and tracking have provided a better basis for teachers to plan with individual students in mind. This development aligns with greater challenge for many students through more effective target-setting.'*
>
> OfSted,

In Ofsteds previous 'Successful Science' report, one of their key findings was that although there was 'at least satisfactory' teaching and learning taking place, there were also *recurring weaknesses with planning and assessments*. The updates in the current successful science publication states that improvements have been made with regard to planning but there is no indication of any improvement in assessments.

Other observations made in the report reflect once again how good individual assessments impact high quality science progress…

> *Good assessment usually accompanied good teaching. Good assessment by teachers and students showed areas for improvement clearly; teachers were able to plan work and intervene to enable individual students to make progress*

So, clearly it is recognized that quality assessments in Science lead to quality learning outcomes.

Assessment itself stated as being the process of,

> *'collecting, analysing and interpreting evidence and using it to make inferences about what pupils know and can do.'*
> Harlen 2012.

Harlen also states that when children are working scientifically, they children need to be immersed in situations where they raise questions, argue, evaluate, discuss, observe, measure etc. Thus highlighting the importance of the moment when children are 'In the thick of it' when considering assessment. This point is clearly stated in her report…

> *Collecting evidence of knowledge, understanding, skills and attitudes involves a range of different assessment methods. The ability to 'work scientifically' <u>can only be validly assessed when pupils are in situations where scientific work such as planning and carrying out investigations is taking place.</u>*

Here, Harlen clearly highlights the importance of assessing when the children are indeed 'In the Thick of it'.

But how should teachers best address quality assessments? Harlen recognizes that some aims of Primary Science can be assessed through quizzes and tests (scientific vocabulary/procedures etc). But she also recognizes that children 'Working Scientifically' should be best assessed by other methods

including *observation*, *listening*, *questioning* and *recorded work*.

So it is clear how important ongoing assessment is to the development of childrens learning of skills in Primary Science. And it is also clear that the methods practitioners should be using are those that catch the moment when the children are immersed in the activity (in the thick of it) or a reflection of that moment through their own recordings.

Intitiatives in ICT

There are a variety of apps and technology currently available to support assessment in science. Apps such as 'Explain Everything' and 'Book Creator' have been used at mid - upper KS2 with children recording investigations using video, images and sound clips.

Other apps (iMovie, Educreations, Showme, Puppet pals, iLapse, Numbers, Doodle Buddy, and Socrative have also been used across KS2 to compliment learning or to aid the assessment process.

However, many of these apps rely upon a level of competence, confidence and maturity by the learner when using. The apps are generic and can be applied or used in many varied situations to compliment learning. The apps flexibility for use is indeed highly valuable in schools. However at FS/KS1 there is greater need for scaffolding in some learning, to enable children to focus purely on the skills or knowledge at the heart of the activity rather than the mechanics of working creatively or in an applied sense with the app/device being used.

My feeling is that there is enormous scope to work with these apps in supporting highly effective and engaging science learning and assessments across the Primary setting.

My Focus

4. Research question

If we use more digital media* and generally make more of the technological opportunities in the classroom when learning science can we catch what is happening when the children are '***in the thick of it***' so that…

- …we improve our **accuracy in measuring achievement of working scientifically**
- …we enhance opportunities to **assess each child** in each class
- …we **increase children's engagement in science learning** through attractive/engaging recording processes .

*iPads and other smart devices, cloud based recording devices and apps such as *Soundcloud* etc.

5. Priorities

How does my question sit within the schools and the Hubs current priorities? Have I checked with key team members/senior staff?

My Enquiry

6. The Intervention

10 primary schools (in Stockport and North Manchester), involving 2 teachers per school (one KS1 and one KS2). Each teacher group will act as reflective partners to explore the use of digital media and technologies.

Practicalities:

- The school has a bank of ipads for use in the project
- Parental permission is given for children to be filmed and photographed *Note: all data will only be used with other schools in the cluster project and within the Hub's funding network. At no stage will photos/films be uploaded onto social media sites, however sound bites may well be used.
- The project will take place over the 2014-2015 academic year
- Teachers will be asked to be reflective and support some data collection activities. These will be tailored to ensure that they help the learning within the project and are not too onerous.
- Teachers will be asked to work together in school time, e.g. delivering a lesson in each other's classrooms occasionally.
- Up to 3 days supply cover funded cluster meetings over the year (£133/year).

Partnered schools will work together using different technology options to investigate what options are available, feeding back and developing ideas as appropriate. A Technical expert will be used to support the project and provide CPD for participating teachers in the cluster to develop individual ideas.

Autumn 1	Getting on board – Project outline with head teachers and establishing which school will be participating in the project. TT to meet school and headteachers to discuss.
Autumn 2	Full day Cluster meet (@ University of Manchester, in November TBA). Project insight and discussion with group and 'Knowledgeable others' (AG) Establish technologies to be investigated and partnerships, key elements to be included/considered. Discuss options and possibilities – produce brief map of individual project
Spring 1	(Up to 14/2/15) - Schools to produce template to be trialed in school Class trials- share ideas and refine projects (feedback). Project leaders to visit schools to review activity.
Spring 2	Half day Cluster meet Class trials cont. Teachers to plan and reflect on each session to develop the next. Feedback prepared
Summer 1	Half day Cluster meet to review impact Filter projects and extend capabilities (consider peer assessment, digital teacher feedback etc – fill in the blanks)
Summer 2	Evaluation meeting

Complete reports and collate findings
7. Evaluation Methods How will you notice, measure and describe what happens?
Teacher Confidence Questionnaire – pre and post SWOT analysis – written and filmed (individuals related to the impact of the project on their CPD) Review of digital media *facilitated during cluster meetings Final reflection report – from the school Submission of at least 2 'creations' per school and 2 examples of them in use

Assessment is the process of collecting, analysing and interpreting evidence and using it to make inferences about what pupils know and can do. In order for pupils to show their competence in 'working scientifically', they need to be in situations where they are raising questions, planning investigations, observing, measuring, analysing, arguing and evaluating. They must also be engaged in supporting their conclusions with argument and evidence and in working with and learning from others.

Other aims of primary science education, such as knowledge of scientific vocabulary and procedures, can be assessed efficiently by short tests or quizzes administered at appropriate times by the teacher. But it is not possible for all the aims of primary science education to be validly assessed through external written tests, such as the national tests, a point acknowledged in the Bew Report. These arguments lead to the conclusion that the situations in which children learn science provide the best opportunities for assessment of their learning. This point was accepted in the government's response to the Bew Report which expressed the view that 'teacher assessment is the most appropriate form of assessment for science at the end of Key Stage 2, so pupil and school level data will continue to be based on teacher assessment judgements'.13

For ascertaining and reporting the achievement of individual pupils, information can be gathered by teachers in a variety of ways. As suggested earlier, these include observation, discussion, short teacher-made tests and pupils' written and oral reports. This information can be used to produce a narrative overview of areas of success and areas where the pupil requires further support, relating to the whole science curriculum as planned by the school

Steps need to be taken – and shown to be taken – to improve the reliability of teachers' assessment, which is necessary for confidence in the results and for preserving validity. The most commonly used methods for assuring the quality and reliability of assessment by teachers are:

using exemplars, group moderation, and using some form of test or special task as a check of teachers' judgements but not to be reported as a part of the result.

The methods of assessment that are stated in these documents (i.e. *how* teachers *currently* and how teachers *should* assess) are quite clear and they include *observation, listening, questioning* and *recorded work*. These practices should…

> • *promote the active engagement of pupils in their learning and its assessment, enabling and motivating them to show what they know and can do • include explicit processes to ensure that information is valid, reflecting all important learning goals, and is as reliable as necessary for its purpose • meet standards that reflect a broad consensus on quality at all levels from classroom practice to national policy • be realistic and manageable for pupils and teachers, with transparent time demands and requiring no more collection of pupils' work than is a normal part of teaching and learning.*
> Harlen 2012

Conclusions…

Teachers should use formative assessment as part of their everyday practice to help pupils achieve the learning that is set out in the school's curriculum for science.

(Free) apps – Explain everything (record an investigation – photo, vid) £1.69
iMovie
Educreations (free)
Showme (free)
Book Creator
Puppet pals
iLapse (timelapse)
Numbers, Doodle Buddy (graph, results display)
Socrative (assessment quiz)

Nb – these generally are used to add pics and text it seems. A structure to guide would be good – non reliant upon children writing (but can if want)

Reflector to show on whiteboard

http://mrandrewsonline.blogspot.co.uk/2012/04/apps-for-science-in-primary-education.html

http://scienceapps.blogspot.co.uk/

http://mrparkinsonict.blogspot.co.uk/2013/05/utilising-ipad-to-enhance-primary.html