Using effective CPD to provide Science support for staff.

Holt Primary School
What a great way to provide CPD for staff which is productive, effective and enjoyable!

Training like this not only helps to raise the quality of teaching and learning but it also provides shared experiences which bond staff and give common outcomes. Look out for the teacher feedback (p12).

An excellent example of professional development.
What the school says

We believe that an activity like this created time for our staff team to work together and be led as teacher/learners.

It focused on developing conceptual understanding by exploring ideas through a first hand, practical experience.

It reinforced the importance of engaging with learning by making it fun, practical, relevant and where contributions are valued.

It was also very easy to resource and do and gave lots of opportunities for sharing and discussing techniques for science teaching.
Why we did it.

A whole school initiative had been underway for developing a more integrated, creative curriculum so we held a practical staff meeting investigating the floating and sinking properties of oranges.

We had moved away from QCA a while ago and had been developing topics based around history/geography/DT themes to develop a more integrated creative curriculum across the school.

As a school we were wanted to use the PSQM focus as an opportunity to explore how we might integrate science into our topic themes more and also how to make science more practical, relevant and engaging for pupils.
What we did -

The activity was floating and sinking oranges (although other fruits were available!)

- It models a highly adaptable Sc1 activity for use in classrooms that engages and motivates children in relevant contexts.
- It provides a fun focus for teachers to work together, sharing their ideas about how to facilitate and manage child-led learning.
- It demonstrates to teachers how to develop conceptual understanding and challenge perceived knowledge through precise questioning, using a range of evidence and testing.
- It highlighted how children could be engaged in many science process skills and how to manage and control the learning in open-ended tasks.
- It demonstrates how all children could make valid contributions to the group learning.
### Focus/objective/question

<table>
<thead>
<tr>
<th>Outcome</th>
<th>How it was addressed / outcome</th>
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<tbody>
<tr>
<td><strong>Is child-led learning the same as practical work?</strong></td>
<td>Addressed through all sections. Conclusion: No! Practical work can be teacher/child/book led – very sterile or very exciting but does not necessarily follow the children’s interests/ or have their ‘personal investment’ into outcome.</td>
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<td><strong>How can we adapt what we do to make it more child-led?</strong></td>
<td>Addressed through all sections. Conclusion: Focusing the children on detail, doing less – but better. Developing the Sc1 skills to enable greater involvement and active learning. Lead the children to raise the questions and allow them to follow through – evaluating afterwards.</td>
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<tr>
<td><strong>How can we manage the outcomes?</strong></td>
<td>Floor books, jib, feedback, discussion of what should happen next - that might be useful/that will give us more information/that we can justify doing. Not all ‘avenues’ need to be pursued. Ideas can be put forward, teacher can decide from them - which will get investigated now/next session. It’s ok to say that a certain investigation won’t give us anything useful. Ok – if some ideas are left behind – as long as there has been general consensus that the ones being pursued might give us the best info. (Important that all ideas have been acknowledged though)</td>
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<td><strong>PR additional objective – how can we focus the children on understanding their learning?</strong></td>
<td>Addressed through: Teaching strategy. Pace - holding back on putting Satsuma in water in order to make observation/predictions/gather information/reason and rationalise/discuss and relate to prior knowledge. This focused the participants ‘down’ on minute detail and created a ‘vested’ interest in outcome as they had already stated an opinion/idea and justified it. They now needed to see if they were right and look for the evidence to prove it. On observing outcome – they had to reason it / adjust / re-think and develop new hypothesis to test. The vested interest in outcome is critical – but it should never be – “I was wrong” but - that was surprising, how can we explain it or find out more.</td>
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<td><strong>How can we ensure Sc1 skills are being practiced?</strong></td>
<td>All sections; And ensure you discuss why they are doing something in a particular way - and did they get an unexpected outcome because of the way they investigated or because they needed to have more knowledge?</td>
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Stage 1
(Model questions):
Handle the Satsuma and describe what properties it has. Are they all the same – what similarities and differences are there?
What reasons do you think there might be for that?
How could we be more accurate in our descriptions?
How could we record these features, as they might be important later? (Some of this information (factors) might become important later – some of it might become irrelevant.
What features/factors are likely to make a difference to how the Satsuma behaves when we place it in the water and what won’t make a difference – can you give a reason for this?

Stage 2
Only one person from the group will put their Satsuma in to start with – what do we need to think about before we put it in?
Before we do, predict and post-it note what you think will happen.
Discuss with a partner your ideas and explain your reasons – including any prior experience.
Can we group these ideas? Is there a common theme?
Does anyone want to change their idea or add on?
Are you ready to observe what happens as we put it in?
How much detail can you notice?

Stage 3
So can we all agree with what happened – write final idea for everyone to see– is that right?
Do we agree it is floating? (Opportunity to clarify this term – even if it is below the surface it is still floating)
Can anyone give reasons for that?

Stage 4
What do we think is the main floating agent?
What would we have to change to make it sink?
What could we do to test these ideas?
Does the Satsuma float without the skin/in segments/does the skin float on it’s own?
(Could we use the skin to refloat it/float other things/would it still float when dried up? What could we use to fix the skin back on?)

What else could we try to verify our results?

The medium term impact was that I was asked to plan a floating and sinking activity with the year 3/4 class teacher, modelled on the ‘Oranges’ activity for their forces science work. (‘Save our Spuds’)

Image of two people looking at a piece of paper with writing on it, and a plastic container with a Satsuma inside.
“What shall we choose?”

“The bubble wrap has air trapped inside. It’s not a dense material. This will help with buoyancy.”

“I remember that the sponge floated when we made our predictions.”

“If we cover our spud in corks they add upthrust and buoyancy. We know that if upthrust force is greater than the pulling down gravity force our potato will float.”

“The candles were a surprise when we made our predictions. Everyone thought they would sink, but they floated. So I used them for my spud’s life jacket. When the spud fell off it, it sank but the canles still floated. It sort of worked.”

“As part of our floating and sinking learning, a practical making task was set. The children had to use their learning to make a life jacket to ‘Save our Spud.’

“Save Our Spuds” Applying our learning through design - investigating floating and sinking.
The potatoes were tested to prove that they sink and a discussion began about possible materials that could be used. The children were able to talk about dense and not dense materials. Light material could be best, but they were also able to recall how some light materials, such as the split pin weighing less than 1 gram, sink. A good recall session used lots of S.V (our Scientific Vocabulary) “To beat the pull force of gravity we have to make a jacket that has enough buoyancy and up thrust force, then it will float” said Abi.

Creating and testing followed with the following results:

<table>
<thead>
<tr>
<th>Jacket material</th>
<th>Reasons for choices</th>
<th>S.O.S results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bubble wrap</td>
<td>Lots of trapped air, not dense, gives buoyancy</td>
<td>Floating potato</td>
</tr>
<tr>
<td>Cork</td>
<td>Saw them float a few weeks ago, light and full of holes and air.</td>
<td>Floating potato</td>
</tr>
<tr>
<td>Tin foil</td>
<td>Thin, waterproof, light we can fold it to trap air inside.</td>
<td>Floating potato</td>
</tr>
<tr>
<td>Night light candles</td>
<td>They were the surprise floating thing from week 1, easy holes to thread string through.</td>
<td>1.String came undone potato sank 2.string stayed attached and the potato floated.</td>
</tr>
<tr>
<td>Pieces of Sponge ball</td>
<td>Light, have seen it floating, trapped air helps it float.</td>
<td>Floating potato</td>
</tr>
</tbody>
</table>
Mrs Macleod had told the class in advance of the activity. Harvey decided to try an experiment at home and bring in his results. He told Mrs Macleod that he had a surprise to share with the class. Harvey said, “I can make my potato float in the water without a life jacket!” All the children watched as Harvey’s potato floated! Harvey had added salt to the water. A huge discussion arose.

The children spoke about how Harvey had made a change to the water by adding salt everything else was kept the same. Also they talked about the Dead Sea and seeing people floating and reading books in the water. Even though the potato was not on the surface of the water, the children could see that the potato floated as our definition of floating is ‘an object suspended on (or in) the water.’ When Harvey stirred the water the potato moved freely around the pot.

Top Science, Harvey! Great learning Ash Class!!
The impact for our school was ..... 

The medium term impact was that the Science Leader and year 3/4 class teacher planned a floating and sinking activity modelled on the ‘Oranges’ activity for their forces science work. (‘Save our Spuds’) 

A term later the year 1 teacher did a similar floating and sinking investigative task linked to their pirate topic. 

The long term impact has been that teachers are more creative in how they present some science activities to children, finding genuine links to topic work and engaging children through practical, fun activities.
Teacher Evaluations: What’s changed?

About you:
In what ways has your science planning and teaching developed this year and better reflects our Principles of Science teaching? What are you doing better/more of?
I feel I am more focused on enabling the class to explore science skills. I have made an effort to communicate my assessment focus to the class so they can show me their learning. I have made more timetable space for extended practical activities and used more TA note taking as a method of recording children’s learning. I have tried to ensure my differentiation both supports and extends pupils in class.

Please describe a science activity or unit of work in your class that has gone particularly well and say why.

About children:
Do you perceive an increase in children’s engagement with science - in terms of their awareness of it’s role and - their interest levels and commitment to their learning? Do you think they are ‘better scientists’ - how do you judge that? Please explain and exemplar your answer.

The children keep referring to the science award and talk about themselves as scientist in lessons. Instances of science spilling over into other curriculum session have been noted: such as our descriptive writing and poetry using our senses; the context of a seascape poem linked to Geography – ‘Lia - We can use our senses just like we did for science week.’ Also in PE-swimming, the children were observed experimenting and discussing science, pushing plastic balls into the water and watching them pop up to the surface – ‘Louie – they are full of air to make them float’. Big questions arise at random in class ‘Sam K - Can anything escape gravity?’

I believe that the class is interested in science and exploration. The focus of working towards the silver award, more class sharing of science through displays and assemblies and the focus of science week has heightened their interest.

Developing expertise:
Do you feel well supported and able to seek guidance when needed? Can you identify your next steps for your own CDP – or what you want to develop?
This exercise in evidence gathering, I feel, has brought the school staff together to share ideas and expertise. I believe the whole school has risen to the challenge and staff have raised their game. Under Pauline’s leadership, I feel supported in my teaching through planning and book scrutiny feedback. I would welcome additional lesson observations to further improve my teaching and organization, looking for additional ways to challenge and extend my higher attaining children.
Science Subject Leaders Comments

The whole teaching staff were involved in the CPD, including the headteacher, so the immediate impact was that we all had a shared experience which allowed us to work together, share our teaching and learning experiences and have fun.

Because we all enjoyed it, the short term impact was that it created a conversation ‘buzz’ in the staffroom for a couple of weeks as it provided the focus of many jibes and jokes - and in so doing, reinforced the experience as we had to explain the ‘links’ to non-attendees!
What we will do next

One action that we have put in place is that every unit of science taught throughout the school, has to have at least one major open-ended, explorative task linked with their topic, where possible.

What next?

1. Distribute a copy of this to staff/upload to server.

2. Task request: Would all staff please build into their current topic, a child-led activity and evaluate how it went. This can be of any length, any sized group and any aspect of the process.

3. Review the impact/manageability/desirability of this approach to learning-end of T2

4. PR - plan another ‘therapeutic’ staff session!