Teaching Evolution in Rural Primary Schools

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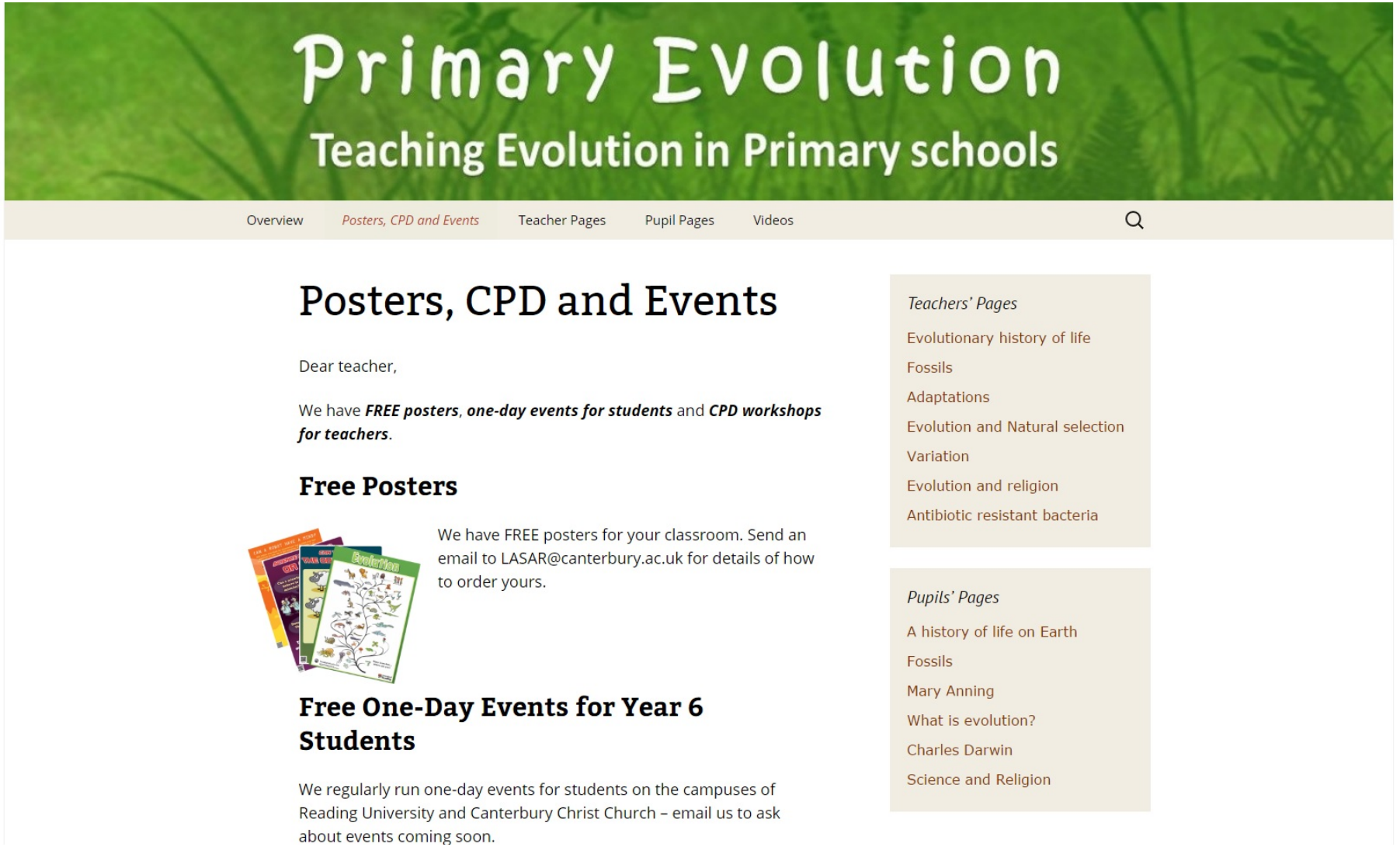
Background

This is the second in a series of projects looking at teaching evolution in primary schools, with over 150 participant teachers.

- Outputs of first project included upcoming research publications, a website, CPD, and a resources for teachers and pupils including posters, and promotion of workshops and CPD events.



Primary Evolution website: visit www.primaryevolution.com

Canterbury Christ Church University LASAR LASARcentre.com University of Worcester wellcome

Objectives in NC introduced in 2014 for year 6

Pupils should be taught to:

- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago
- recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution

Concerns about teaching evolution in primary

- Primary teachers do not necessarily have a strong science specialisms (unlike a secondary science teacher may have)
- Teacher confidence
- Poor understanding of evolution on the part of teachers
- Concerns with evolution and belief systems

Research questions:

- What are teachers' perceptions of the challenges and opportunities that affect the effectiveness of science education in rural schools, and how does appreciating those factors influence the design of the Evolution on Rural Tour strategy?

- What is the efficacy of the Evolution on Rural Tour strategy as a way to improve and enhance biology education in rural schools?

- In the light of review and participants' feedback, what refinements can improve the effectiveness of Evolution on Rural Tour?

What is a ‘Rural’ school?

Areas forming settlements with over 10k residents are considered urban. All else fall within various categories of rural.

The Department for Education considers schools rural when they are located in…

- towns and fringe areas
- villages or hamlets
- isolated dwellings

9,260,892 (17%) of total population of England (54,316,618) lived in rural areas in 2014 - 15.9% of that rural population is under the age of 14.

There are currently 4151 rural primaries in England (Defra, 2017)

A significant proportion of these are CofE.

Characteristics of rural schools

45% of the rural population have ‘reasonable’ access to a primary school by public transport or walking, and 58% have it by car (2013) (Defra 2017)

Overall levels of employment, affluence and educational attainment are higher in rural than urban England, but such figures mask wide variation and considerable poverty, low paid and/or seasonal employment and low achievement. (Hargreaves, 2009)

In rural primaries this is complicated further by:

- Access concerns and distance from science museums or centres, libraries or teacher training centres
- More limited budgets and resources
- Shortage of specialist teachers and limited access to CPD

Evolution on Rural Tour (ERT) Strategy

- Funded by the Wellcome Trust
- Rural development of a project which sought to identify challenges and barriers to teaching evolution in primary schools: focuses on the rural experience and on providing CPD
- CPD workshops and support for teaching evolution and inheritance.
- Largely qualitative methodology which allowed for in-depth picture of a small sample, worked with 9 schools and gathered data via interview from 12 teachers and via survey of 7 teachers.

Time	Action
Jan-Feb 2017	Submit plan to the University Ethics committee for approval. Promote Evolution on Rural Tour to selected schools through networking, advertising and approaching schools directly. Telephone interviews with potential participating schools
March-June 2017	Prepare workshop materials. Tour of 9 schools: conducted workshops and case studies in each school, interviews with participant teachers and implemented online questionnaire for participant teachers.
June-August 2017	Evaluation, report writing, network meetings

Participant schools

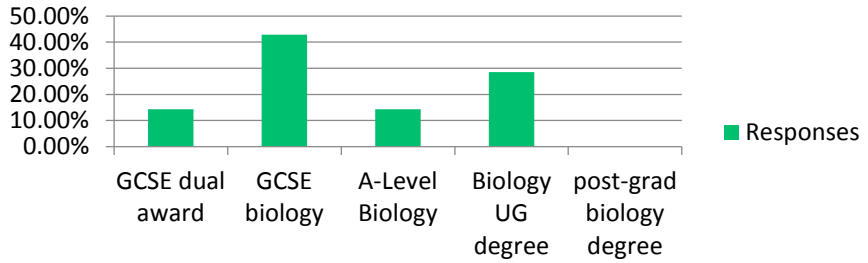
9 schools across Kent, Worcestershire and Herefordshire, chosen for variety of sizes, deprivation indices and number of students eligible for FSM

School	# pupils on roll (2015-16)	% Pupils with SEN/EHC	% Pupils eligible for FSM during past 6 years	# Teachers	Avg deprivation decile for district (1 being most deprived 10%)	Ofsted effectiveness and date of inspection	Science specialist on site?
School A	211	0.9%	9.5%	15	8	Good Jul 2016	1
School B	199	1%	9%	9	4	Good Apr 2013	No
School C	182	0%	13.7%	11	6	Good Nov 2013	1
School D	89	0%	27%	9	6	Good Jan 2016	1 (on ML)
School E	92	1.1%	1.1%	8	4	Outstanding Sep 2011	No
School F	107	0.9%	16.8%	5	4	Good Sep 2013	N/A
School G	412	0.5%	14.8%	25	8	Good Jun 2015	N/A
School H	53	0%	20.8%	4	5	Good Jun 2016	No
School I	346	1.2%	45.9%	22	6	Good Feb 2014	No

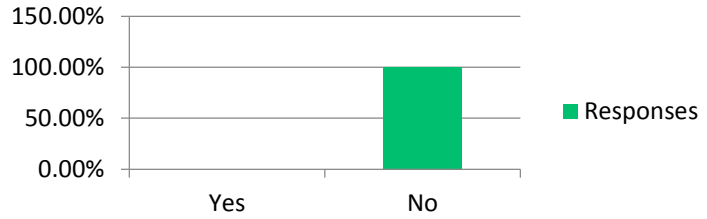
Participant teachers

- 12 teachers participated, 7 responded a survey and 3 provided survey answers during interview
- 70% Up to A-level Biology qualifications
- All teachers taught between 1 and 2 hours of science every week. Only two teachers had made trips to science museums or centre in the last year, and three had received any visits from science education groups.

What is your highest level of biology qualification? Please choose the one that most closely relates to you:



Have you received any previous CPD focused on evolution and inheritance?



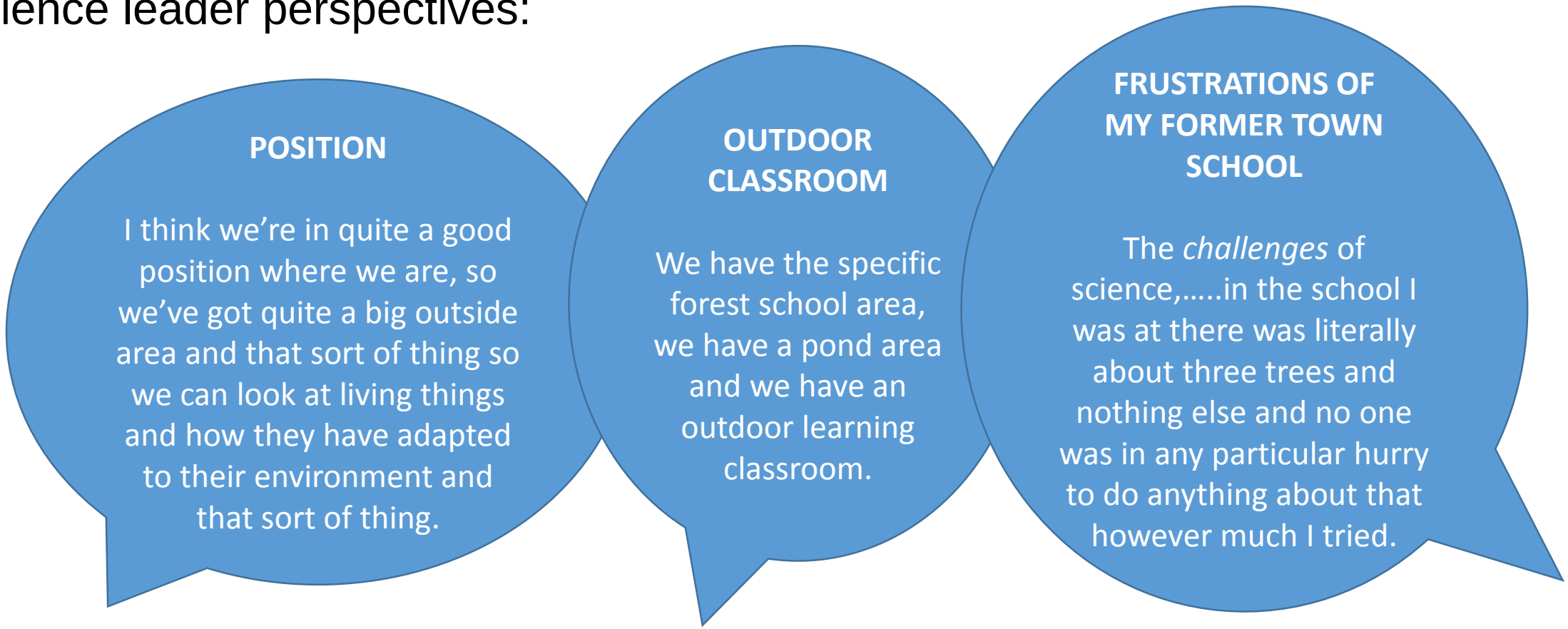
One part of the study – detailed case studies of three schools

- Included detailed case study approach of three schools because
- Case studies emphasise detailed contextual analysis of real life situations.
- They can provide a basis for the application of ideas and extension of methods.
- Multiple sources of evidence can be used.
- Empirical inquiry can provide insights into “contemporary phenomenon where the boundaries between phenomenon and context are not clearly evident.” (Yin, 1984, p. 23)

Case Study

Advantages of being a rural school

Science leader perspectives:



Disadvantages of being a rural school

BUDGET CONSTRAINS CREATIVITY

The thing that's harder, I think, is the buying in of extra resources as we're going along and want to upskill and that sort of thing because actually our budget is so small….. it slightly more limiting on the things that you do want to do in the classroom or when you want to bring living things in.

LIMITED CPD

it is harder to send people on courses or get people in and that sort of thing, so we're relying at the moment on me delivering CPD, which is working but it will take a while to obviously have the number of opportunities that we need to.

Challenge for the school and research team

Being Paleontologists

Do I have to do this lesson indoors or actually can it all be done outside sort of thing and getting the kids out and about a lot more?

Evolution of a species happens over such long periods of time, evidence is usually taken from fossils.

- What are fossils? Where can we find them?
- What kinds of fossils can we find in chalk?

Encouraging Investigations: Being Rock Pool Detectives

- *What are the challenges of this habitat?*
- *What lives there?*
- *How have the animals adapted to help them survive?*

- environment
- habitat
- adaptation
- variety of life

They were going, 'ooh that one's really jumping, it needs to do that because…', and looking at how it's evolved and all the rest of it, they were really excited by it all.

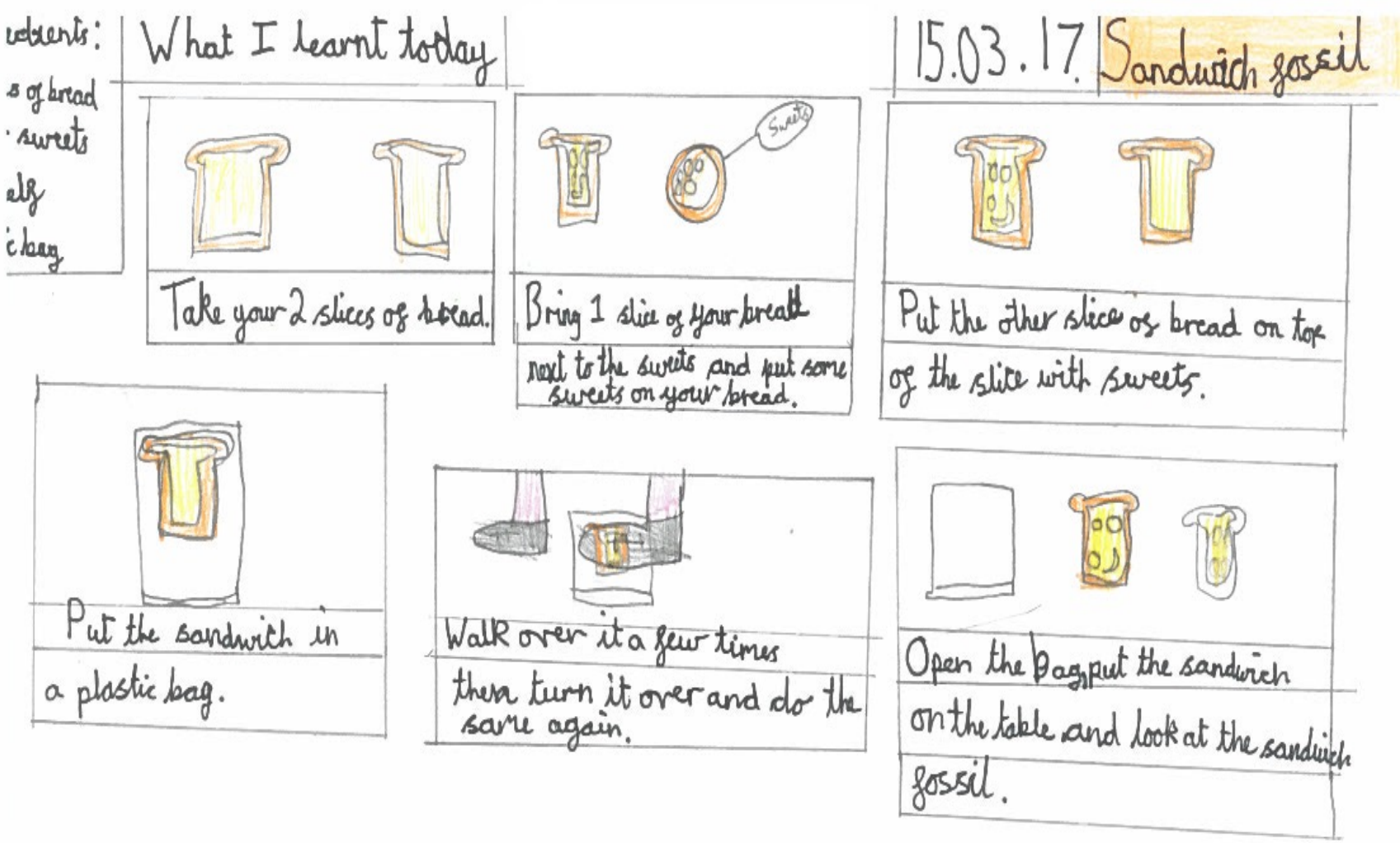
Practical activities to support subject knowledge development

SCIENCE LEADER OBJECTIVE

A few teachers that admit that they've got a lack of skill in that area so I'm trying to give them that CPD to make the science teaching better in the school really .

Simple cost effective resources to investigate fossil formation

Sedimentary rocks form layers so animals and plants get trapped between the layers.



Case study outcomes and implications

- Use of simple, safe accessible resources for focused observation
- Engagement of children - making science exciting for them
- Lots of activities versus time for in-depth pupil questioning
- Extension of more able pupils
- Meaningful cross-curricular links and tackling evolution across science and religion
- Access to video footage and internet resources (beyond Pinterest) to enrich learning –

  'The video that we had which was a cross curriculum with English looking at fact and opinion. That sort of thing was actually really nice. I always struggle to find that sort of thing when I'm looking on YouTube.'

- Networking - enabling science leaders to share expertise across rural schools
- Assessment tasks

Findings: challenges and opportunities

Challenges:

- Limited budget and resources
- Teacher confidence
- Diminished profile of science in the curriculum

Opportunities:

- Proximity to a variety of natural environments
- Small and tight communities, both inside and outside the school
- More opportunities for cross-curricular learning

Although some teachers identified a possible clash between evolution and religion for some children, and felt it was hard for them to feel it is not their place to ‘tell them what to believe’, only one had experience such a clash in the classroom. No participant schools were religious in character.

Feedback into the ERT strategy

- All teachers found it very successful in giving them the confidence to execute simple and affordable practical ideas and activities to support learning within the evolution topic.
- The CPD fitted in with teachers' existing structures or teaching styles
- It complemented existing outdoor learning opportunities
- Practical engagement for both able and less able pupils
- The CPD facilitated learning about evolution in a logical, consistent manner

Feedback into the ERT strategy

- Teachers might benefit from opportunities to engage with other teachers in rural contexts or with secondary teachers
- Encourage and develop a range of strategies to teach evolution through cross-curricular means
- Teachers suggested they would welcome more lesson plans and activities that are targeted to specific year groups and learning objectives
- Capitalising on the Primary Evolution website to upload CPD, resources and ideas specifically for rural schools

Why is this type of pedagogical research important?

- Curriculum development
- Opportunity for younger children to access scientifically "tricky" concepts.
- Topic which can foster scientific debate around biology and health, and contribute to "how science works agenda"
- Support life long learners in acquiring necessary skills to be scientifically literate in the face of a rapidly evolving technologically driven society.

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Thank you for listening!