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## CHAPTER 2

### **Persistence and perseverance: Working with University Research Ethics Committee (UREC) processes to elicit children's views, voices and volitions.**

*Chapter in preparation for Routledge Book:  
Thinking critically and ethically about research in education.*

*To be placed in Section 1: Research empowering Children and Young People.*

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#### **Abstract**

This chapter centres on discussion about the ethical deliberations that exist around researching learning in classrooms using a range of methods to collect data (including digital technology to video and audio record participants). By adopting an ethnographic approach, the impact of an interventional lesson on young pupils scientific understanding is researched. This chapter focusses on a particular classroom case, where the learning aim is to support eight and nine-year olds to understand the challenging science concept of evolution. Research instruments included pre- and post-test data alongside the videoed and audio-recorded data (later transcribed), to not only provide evidence of learning processes but to also examine how dialogic and actional exchanges between the teacher and her pupils support epistemic insights. The ultimate aim being to examine the multiple ways that talk, gestures and collective participation in activities contribute to emergent learning.

In the illustrated case considered here, the use of digital technology enabled a continuous record of events over an hour's lesson, so that critically creative learning moments were clearly evidenced and corroborated in both visual and auditory forms. Cognitive progress and outcomes assessed through pre- and post-lesson questionnaires were also triangulated with audio-recorded teacher and learner reflections.

#### **Introduction**

This chapter discusses the research design, data gathering and analysis of creativity in a science lesson. The particular classroom case reported on here is selected from a much larger externally funded project involving many more schools and several hundred pupils (<https://sites.google.com/brookes.ac.uk/illustratingcreativepractice/homepage>).

It is challenging to define learning because it is something of an ephemeral and elusive process and educators vary in the ways they describe it. Within this chapter we have adopted a view that social constructivism (adapted from McGregor et al 2020, in figure 1) provides a well-recognised theorisation of the multiple processes that contribute to interactive learning. To capture evidence of these various processes (indicated in figure 1), including peer-peer discussion, for example, that can mediate another's understandings and are challenging to remember after the event. Sometimes they can be approximately recounted by an observer (and aspects perhaps even committed to a written observation schedule) but the detail of dialogue is impossible to recollect accurately throughout an hour-long lesson without recording such. Also, verbal and actional exchanges often transpire so rapidly in response to happenings in the classroom, that unless a clear and

unequivocal recording of the conversation and corresponding actions are evidenced (including who said what) illustrative quotations cannot be wholly accurate. Amongst these dialogic and actional exchanges that give rise to original and creative thought, are demonstrations of ways young learners appear to make sense of things presented to them. The illustrative case documented in this chapter is related to Darwin's work, life and study of evolution particularly the adaptive changes he noticed that arose between moths and orchids (Darwin, 1877).

We recognise that the nature of learning has been theorised and understood in many different ways over the years, spanning behaviourism, constructivism, constructionism, social constructivism and embracing social-cultural perspectives. There is also the common discourse that centres on 'moving learning forward' or 'delivering the curriculum', which overlooks the key interactional processes at play when learning is participatory, dialectical and collaborative in nature. Head teachers, classroom practitioners, researchers and even pupils themselves also each hold different assumptions about how, where and when learning arises.

Additionally, witnessing happenings in lessons as non-participant researchers or observers without any digital recordings of happenings as they unfold, limits what is noticed and does not enable detailed evidencing of individually uttered exchanges arising between pupils at a micro-level (Olive 2014) of learning. Video recording and capturing classroom enactments as they develop and unfold can provide illustrations of learning through activity that can be examined carefully to work out how ideas emerge from pupils. A supplementary benefit of digital data, is that it can be repeatedly reviewed and scrutinised for varying forms of evidence that illustrate learning processes, as well as elucidatory moments and indications of thinking from multiple viewpoints (each relating to the various processes identified figure 1).

Eliciting understandings of learning solely from a learners' perspective (through questionnaire or interview) or only observing as a 'voyeur' (Mannay 2016) or anthropologist describing observations from a distance, the extent to which key interactional moments are evidenced is limited. To appreciate how young pupils engage in, relate to each other, discuss and inter-act, in order to work collectively to achieve the task at hand, it is essential to observe closely how their exchanges demonstrate their understandings developed within learning contexts (Martin-Millward 2020). Therefore, by using digital technology (as outlined in this chapter) illustrative evidence of learning processes can be naturalistically obtained.

The mixed methods approach, adopted here, facilitated the collection of both quantitative evidence of cognitive development (through improved performance in the pre- and post-test) and qualitative data, to examine the ways in which socially constructivist processes appeared to underpin learning about evolution. This approach was adopted to ensure sensitively that what Van Mechelen *et al* (2020 p.5) referred to as *participatory ethics*, which '...concerns the value of participation and representation, and how we engage children actively in the research', was adhered to, and accounted for. Thus, the quantitative and qualitative data acquired in parallel were both considered from an epistemic

perspective so that the approach adopted would indicate *what* they learned about evolution as well as *how* they learned it.

**INSERT HERE : Figure 1 : Prominent learning processes teacher behaviours and expectations implied by the social constructivist view of learning (adapted from McGregor *et al* 2020).**

**Alternate text : A diagrammatic representation of the various processes in learning that constitute the theory of social constructivism in practice.**

### **Theorising social construction**

Teachers, as practitioners at the front of a classroom orchestrating learning, will struggle to observe, listen and appreciate the extent of original contributions each individual pupil makes in a lesson. Noticing when, where and how each individual contributes to classroom endeavours is an impossibility for a single teacher. This is recognised in the project findings reported on in this chapter. The chapter reports on scrutiny of a lesson that involved a range of different small group and whole class participatory activities. Drawing on Vygotskian assumptions that development of thinking and learning is social in its origin (as depicted in figure 1) emphasises the importance of the dialectical interplay emerging between learners. Through focusing on the ways that pupils solved problems collectively (with their peers and/or teacher), the research examined the nature of talk, their actions and ways they worked together:

‘Children solve practical tasks with the help of their speech, as well as with their eyes and hands. This unity of perception, speech and action, which ultimately produces internalisation of the visual field, constitutes the central subject matter for any analysis of the origin of uniquely human forms of behaviour’ (Vygotsky, 1978:26).

Social constructivism supported by teachers (as characterised in figure 1) theorises illustrations or junctures in the videoed lesson where processes contributing to joint problem-solving could be evidenced (McGregor *et al* 2020). These were assumed to illuminate the nature of participants’ zones of proximal development (zpd), which is ‘the place at which a child’s empirically rich but disorganised spontaneous concepts meet the systematicity and logic of adult reasoning’ (Vygotsky, 1986 p35). As Griggs and McGregor (2012) suggest, mediation is key to underpinning this Vygotskian perspective, which construes the zpd as the distance between the initial engagement and mastery of the task at hand (Wood *et al* 1976). To empirically explore the nature of the zpd space requires sophisticated research tactics (and multiple tools) to elicit how pupils are working dialectically and collaboratively to work on tasks.

Asking pupils for their views via questionnaire responses can provide written indications of their understandings developed and accrued through participation in the lesson. Questioning them verbally through interviews or focus groups can also extend their descriptions of ways they might conversationally reflect upon and explain how they interpret and recollect their learning experiences. However, capturing pupils’ voices to evidence the in-the-moment development of ideas is possible through lapel-attached microphones that record individual contributions to conversations as they emerge in

learning. Video recording classroom activity can naturalistically indicate ways that pupils' move and situate themselves in relation to others and the classroom space. It can also illustrate (to some extent) the influence that materials, tasks, teacher management and organisation, peers etc. have on learning. Evidencing unequivocally all their utterances throughout a lesson provides much greater in-sight into the cognitive processes of an individual in a learning episode.

Throughout this process the utmost sensitivity was required so that individuals did not have their privacy invaded when, as researchers, we attempted to elicit insights about their construed understandings as inferred from their actions and utterances. The visual and auditory data collected required careful and thoughtful handling to ensure anonymity, whilst at the same time allowing in-depth tracking of the development of threads of thought, lines of action, progress in problem solving and individual contributions to collective outcomes. A key intent underpinning the project was to assert whether or not 'new' scientific ideas were realised by the pupils and how far the processes of learning (see figure 2) through social constructivism (figure 1) contributed to the development of their understanding about Darwin's concepts related to evolution.

### **The ethical considerations of the research project**

As the aspect of the project reported on for this chapter took place across a range of schools where pupils were under the age of 18 years, there were a range of key principles that had to be taken account when inviting the pupils to be involved in the research.

The five key principles (adopted from BERA 2018) that were adopted and adhered to include:

- Inclusivity of those with different interests, values and perspectives.
- Respecting participants' anonymity, confidentiality and dignity.
- Ensuring that the project was carried out with integrity, employing the most appropriate research methods.
- Maximising benefits from the research whilst also protecting and minimising risk or likelihood of harm for participants.
- Obtaining informed consent prior to the data gathering stage and ensuring the right to withdraw is explicit.

The methods listed in figure 2 had to be justified in order for ethical approval to be granted. As outlined earlier, questionnaires, group interviews, video of the lesson and individual audio-recording of pupils' talk were designed to provide juxtaposed insights regarding the processes of pupils' learning about evolution.

### ***Participants' views about their learning of science: Elicitation via questionnaires***

Administering questionnaires is a common and readily accepted approach that often purports to elicit students' (and teachers') thoughts, views and ideas about teaching and learning (Luce and Hsi 2014) and is highlighted by well-cited reports. Many rely heavily on large scale surveys, for example, the Wellcome Trust (Hamlyn *et al*, 2017; Leonard *et al*, 2017). Findings from these surveys provide much quantitative evidence from the samples of respondees who report their views about family connections with science, engagement in extra-curricular science, enthusiasm for science, self-reported success in science, views of the purpose and regularity with which they claim they do practical work etc. All these

quantifiable self-reported responses, however, do not disclose the nature of individual and/or collective participation in specific classroom learning activities or indeed any details that capture the complexity of human behaviour and interactions that impact on social constructivism. There is scant insight into the nature of physical, social, and cultural influences on teachers' and learners' thinking and ideas related to the classroom environment (Kitwood, 1977 cited in Cohen *et al*, 2011). Eliciting only self-reported perspectives from pupils constrains the insights they can convey about learning processes. In the case discussed in this chapter, pupils were invited to answer questions about their understandings of adaptation and evolution at the beginning *and* end of a particular lesson. The questionnaire administered was used as a pre- and post-activity test, to assess the extent to which pupils had conceptually changed their views regarding a scientific concept after engaging in a lesson designed to develop their understanding of Charles Darwin's work on Evolution (see table 1).

The request to gain ethical approval to gather data about learning via a brief before and after pupil questionnaire was unproblematic and straight forward. It involved providing a copy of the questionnaire itself, an information sheet for parents and pupils and a consent form to be completed and returned prior to the focused lesson, for the University Research Ethics Committee to review and approve.

### ***Participants perspectives of learning: via group interview***

Investigating what pupils think about their learning experiences can be sought through questionnaires, but reflective *discussion* after an experience can render much more rapid, in-depth information. That is, eliciting views through discussion captures much richer descriptive detail (Archer and DeWitt, 2017) than questionnaires alone. However, ethically the request to interview a small focus group of pupils requires more detail than a questionnaire. An information sheet explaining why a discussion and canvassing pupils' views after a lesson was required, the questioning schedule, and a consent form for parents and pupils to sign and agree or disagree to quotations being used in publications (with or without identification of the source) was needed for ethical approval.

As researchers, we wished to hear the pupils' *voice* and know as much as possible about *their* view of the learning experience. Knowing there is a questionable correlation between the teachers' espoused views of their practice and what was evidenced by a non-participant observer (Johnston 2007; Davies *et al* 2004), we wished to elicit pupils' views to contrast and triangulate other data collected about learners' perspectives. Being able to draw on transcribed quotations (ethically approved) provided more insightful evidence demonstrating more clearly pupils' voices concerning their views about learning a challenging science concept such as evolution.

**Insert here Figure 2: The relationship between the ease of ethical approval and the complexity of data collected.**

**Alternate text : A diagrammatic representation of the various forms of data collected in the case described here and the relative ethical challenges that had to be overcome to elicit them from participants in the research project.**

### ***Participants' emergent inter-actions: Elicitation via video recordings***

Eliciting how pupils participated in the classroom activities and observing who did what, enabled elicitation of a range of moments when social constructivism was enacted. This kind of evidence was not possible to acquire through questionnaires or interviews. The video data provided a clear chronological record of teacher and pupil actions and interactions, many of which provided narrative, contextualising threads of ongoing processes of learning. Sangiorgio (2015), in researching the collaborative generation of music amongst pupils, recognises the value of video recording to secure evidence of both verbal and non-verbal actions in interactions. She discusses how, without video recordings, it is not possible to capture the nature of pupil's experience of making music (p. 259). Video recordings, she argues make it easier to acknowledge the contribution of individuals to a collaborative endeavour. Evidence supporting the ways that other studies had also needed to draw on video data, to elicit the nature of learning, is provided by Derry *et al* (2010) who argued that the

'...rapid and widespread availability of affordable, usable, high-quality video technology is transforming the practice of learning science research. Because new video technologies provide powerful ways of collecting, sharing, studying, presenting and archiving detailed cases of practice to support teaching, learning and intensive study of those practices, many learning science research projects now incorporate a substantial video component' (Derry *et al* 2010, p. 4).

The ethical approval application argued that videoing the lesson would digitally record verbal and non-verbal interactions of both the teacher and the pupils. The use of video recordings in data collection is more problematic for ethical approval because of potential child protection issues. However, this was mitigated by arguing that the use of video clips is not unprecedented, indeed there are instances of these being uploaded to educational websites (McGregor *et al*, 2013; Wilson and Mant, 2010). However, the information sheets, consent forms (agreeing or not to share quotations, visual images, etc with/without identification), privacy agreements, data storage and assuring the anonymity of participants, *if requested*, meant the documentation had to be far more comprehensive than the request for the use of questionnaires and interviews. Ensuring these steps were rigorously completed meant that progress to positive approval required more preparatory documentation as pupils' anonymity had to be assured if they requested it. Ultimately, it was also argued that, to enable time-poor teachers to benefit from the outcomes of this research ways of disseminating the outcomes for practitioner use had to be detailed. Dissemination from the research included providing annotated video clips for teachers to observe, not only demonstrating good practice, but also including illustrations of pupils' voices and volitions elicited in the learning process. Presenting the research in this way meant that data captured as an hour-long video, or hour-long audio files had to be analysed, synthesized and then summatively transformed into bite-sized sections illustrating the multiple ways that a teachers' practice can influence pupils' learning (<https://sites.google.com/brookes.ac.uk/illustratingcreativepractice/homepage>).

### ***Participants' emergent threads of talk: via digital audio-recorders***

Eliciting the nature of learning interactions and following threads of discussion was also possible through audio recording all verbal utterances of individuals throughout the lessons.

This was achieved via lapel mounted microphones and recorders carried in a pupil's pocket or a small shoulder bag. Without the addition of this data collected through these individual recordings it would not have been possible to track the threads of different pupils' conversations and realise how they talked to each other (and demonstrated peer-peer interaction as part of social constructivism) whilst on task during the lesson.

Ethical approval was sought for audio-recordings through the information sheets and consent forms to headteachers, teachers, pupils and their parents. However, to alleviate coercion, headteachers were first approached, who in turn replied whether or not they agreed that their school could be involved. Then the researchers could approach the teachers and subsequently the pupils and their parents. Clear consent protocols ensured that the potential for negative power-play to be mitigated against and the opportunity for pupils to ask questions of familiar adults, such as their class teacher gave them agentive opportunities to decide whether or not they wished to participate in the research.

### ***Participants' emergent actions and talk: via merging digital video with individual audio recordings***

As stated above, eliciting how individuals participated in, and learnt about evolution through, various classroom activities and social interactions was possible through videoing the whole class *and* recording discussions through lapel mounted microphones and audio-recorders carried by the pupils. As Mannay (2016 p.28) suggests, this highlights how 'familiar territory' (in this case pupil talk and action in classrooms), are combined to look beyond what is oft reported to elicit unique viewpoints that include being able to juxtapose learners' utterances with the ways they actually *engages with* and *participated in* classroom activity. As researchers we elicited fresh insights about the ways participants 'act' in learning, offering significant 'epistemic privilege' (*ibid*) concerned with understanding a challenging scientific concept, evolution.

## **Outcomes from the project seeking illustrations of learning in science classrooms**

### **Pre and post data from the questionnaires about evolution**

The class of eight and nine-year olds completed a questionnaire at the beginning of the lesson, with no feedback at all, they were invited to complete exactly the same assessment again at the end of the lesson. The results from this pre- and post-assessment approach were an attempt to gauge the development of pupils' scientific understanding before and after being taught about evolution.

The self-reported pupils' responses provided evidence that they had improved their understanding of the evolutionary process, i.e. that animals couldn't instantly change their appearance, that it took a long period of time, that the availability of food in the environment for an animal could change how it adapted to access it, and therefore their morphology changed over a long period of time. This data provides evidence that pupils better understood a difficult scientific concept. However, without the video and audio-recordings of classroom events, it is not possible to say how they came to know more about evolution. With only questionnaire data, it is not clear what may have influenced the pupils' development in understanding. Ethically, implementing the questionnaire, we were able to adhere to the five BERA (2018) principles in the following ways:



- Inclusivity - *All* pupils could participate because the mode of responding was quick and easy, selecting the appropriate face that represented their view of 'yes', 'no' or 'don't know' (no-one was unable to respond to the written aspect of the questionnaire);
- Respect - Pupils anonymity and confidentiality was retained through just comparing the 'whole' cohort responses pre- and post- lesson;
- Integrity - For ease and rapidity, collecting a comprehensive overview of *all* the pupils understanding pre and post the learning activities the formative questionnaire design was most appropriate;
- Minimising risk - The teaching and learning benefits from this approach protected individual identity and risk or harm to participants was negligible;
- Informed consent - Written consent was obtained prior to the lesson, from both parents and pupils, and even before completing the questionnaire all participants were verbally reminded they could choose to withdraw whenever they felt uncomfortable.

Written questionnaires, as Cohen *et al* (2018) suggest, are cheap, reliable, valid and quick to complete (p. 471). The data elicited provided evidence of the improvement of the whole class performance. However, it was not possible to relate improvements to individuals' understanding because ethical guidelines, relating to questionnaire responses, deemed anonymity necessary. Therefore, researchers interpreting these kinds of findings from a whole group of questionnaires can only make assertions related to percentage (%) shifts in responses to the questions in a general way (see table 1).

What is impossible to assert from just the questionnaire data is information about the process of coming to understand something, the personalised narratives of learning experiences and individual views about ways the tasks engaged with mediated learning.

### **Interviewing pupils about their views**

In order to elicit what was salient to the pupils' about learning about evolution through the lesson activities and the ways the interactions in the lesson aided their comprehension of that particular science concept, it was important to ask them about their learning experiences. In this case, a focus group approach was adopted. As Cohen *et al* (2018; p.527) suggest this can be more cost-efficient, time-efficient and generates a wider range of perspectives regarding the participants' views of a happening.

Two boys and two girls participated in the focus group. Their discussion with the researcher was audio recorded and transcribed for analysis. As Cohen *et al* (2018) suggest, the pupils themselves are the best source of finding out what their world or situation is like as 'seen from their eyes' (Docherty and Sandelowski 1999 p. 177 cited in Cohen *et al* 2018, p. 529) because, as explained previously, what the participants [pupils] perceive as salient in their classroom experience, may be quite different to that which adults [teachers] might consider important.

The way the group interview was managed and organised adapted and applied ethical principles (BERA 2018). To ensure the pupils felt comfortable, the focus group discussion

was carried out in the classroom where the lesson took place, thus guaranteeing full familiarity with the location (Cohen *et al* 2018, p. 528). It also took place immediately after the class experience so recollections were fresh and easily recalled (Cohen *et al* 2018). Open questioning was used in order to convey that no 'correct' or 'expected' answers about their experiences were needed (Cohen *et al* 2018, p.530).

It became apparent that beyond the information gathered through the questionnaires, that the participants recognised, in the focus group discussion, the discreet activities within the lesson. Their recollections were specific to different activities. For example, one pupil recognised the contextual nature of Darwin's work, indicating how he thought that the historically appropriate objects the teacher had used to support the opening dramatic duologue at the start of the lesson, illustrated 'olden day stuff that [Charles Darwin] would have used on plants...'. Another pupil recognised how they were enacting an aspect of the process of adaptation by being a moth or an orchid, he stated, 'when we were holding the flowers [plastic bottles representing orchids] and we were being the moths [party blowers blown to create extended proboscis] trying to get nectar from inside the flowers'.

Additionally, this pupil also said, 'I think about the tongue thing I looked in the bottle, and forgot who it was, couldn't get it [the proboscis] down [to the bottom of the orchid]. Then, somebody else came along with a paper one [foil party blowers were shorter] and got it right down. I was like, ...oh, it must be tongues...it's so long'.

Another pupil reflected that there were opportunities to consider and explain what they were modelling (i.e.: by forming a tableau, a series of still poses to represent Charles Darwin's scientific attributes, such as ) with their bodies, because she said, 'we were thinking of ideas of what might actually be happening around us'. These comments from the pupils suggest how the interactional nature (through social constructivism) of engaging in the various activities promoted participation and offered them opportunities to generate and form ideas, make decisions where there were choices about what to do and decide how to solve problems.

Thus, the research question it becomes possible to respond to is:

'How do pupils' perspectives of the learning process relate to, or help explain, the improved understanding of evolutionary concepts?'

From analysis of the transcript of the focus group discussion, it was possible to elicit more about the nature of learning experienced by the pupils in relation to their understanding of adaptation and evolution than through the questionnaire data alone (table 1). Without the combination of both quantitative data (from the questionnaire) and qualitative forms of data (elicited through the focus group discussion), it was difficult to evidence that social constructivist processes contributed to learning (figure 1) about evolution. However, the exact nature of exchanges supporting learning, what was said and done by whom and when, is not possible to elicit without further observational data (from the video and audio recordings). Triangulating visual and auditory observational data with the pupils' reflective accounts elicited through the focus group interview, augmented perspectives of the classroom processes that supported development of understanding about evolution.

### **Digital video and audio recordings of lesson episodes**

In the evidence that emerged from the research reported on in this chapter, without video recordings, the interactional and social nature of the learning journey (Mannay 2016) of the pupils (and teacher) outlined in figure 1 would not have been possible. Both visual and auditory data was needed to elicit how pupils talked and acted, related to each other and mediated each other's zpd when they worked collaboratively. The various processes demonstrated during learning (as indicated in table 2) suggest how pupils persisted in activities, demonstrated initiative, developed ideas, offered suggestions for others to consider, influenced each others ways of solving problems etc. This was not possible to elicit via either the questionnaires or a group discussion alone. Moments and threads of interaction as well as elucidation could only be demonstrated through a method that could capture a record of events, happenings, actions and reactions as they unfolded within the context of learning about evolution in the classroom.

**INSERT HERE : TABLE 1 : Nature of data garnered from the pre and post-test.**

**Alternate text : A tabular summary of the pupils' responses at the beginning and end of the lesson to the same questions about evolution.**

In contrast to the questionnaires and focus group methods, the video data and audio analysis enabled exploration of the ways the pupils within the class understood things and also the 'meanings they attach to happenings' and 'to grasp the *native's* point of view....to realise *his [or hers]* vision of *his [or her]* world' (Malinowski 1922 p.25). As researchers our interest in *how* and *why* these pupils came to understand the complex concept of evolution, as a result of the teaching intervention, was paramount. The 'ethnographic' approach (Cresswell & Cresswell 2018 p.13), assumed that in analysing the 'actors' participation in social episodes there was construction of understanding about what the pupils were doing in response to particular events and activities. As researchers, we assumed that the pupils acted with intent (to engage with the tasks) and in so doing were making meanings in, and through, their activities (Blumer, 1969).

Deductive analysis (by applying a social constructivist framework as indicated in figure 1) of the transcribed video and audio data enabled evidencing of the types of learning actions and discussion the teacher and pupils engaged in. An episode where several elements of social constructivism were clearly enacted was demonstrated when pupils were moving around the classroom, in-role as moths and orchids. During this activity some of the pupils tried to model collecting nectar, as moths, using party blowers as their proboscises, to reach down into model orchids (made from upturned plastic bottles with a small amount of coloured liquid in the bottom). One pupil assumed, that as a moth she could 'touch' the model (bottle) orchid, on the outside, at the base to obtain the nectar. However, what became apparent when the teacher queried what she was doing that she had not appreciated that her model party-blower proboscis had to be inserted right down into the model orchid's nectary to reach the fluid representing nectar in the bottom of the tube. This exchange was captured on video (visually) but the precise verbal exchanges could only be heard through the lapel microphones (not the digital camera recording). From these two different data sources it was possible to witness a very specific moment of social interaction mediating a learner's construction of the way the moth and orchid model worked. That is, the teacher extended an opportunity to the pupil to re-consider what she was doing and

decide how to re-orient her use of her model proboscis to successfully collect nectar (the coloured liquid) from a model orchid. Her revised enactment was seen through her adjusted movements towards targeting the inside of the nectaries of the much longer (modelled through up-turned plastic bottles) orchid tubes. Without both video and audio data including the discussion, context and re-directed actions, reflecting development of understanding of the moth and orchid relation, that moment of social construction would not have been possible to construe.

The need to pursue combining pupils' individual audio recordings with their actions from the whole class video became revelatory. Table 2 illustrates how illuminating different sources of data can be when endeavouring to better grasp naturalistic observations of participation and interaction in learning. It evidences how the fine-grained approach elicited the extent to which the pupils generated fresh and original ideas, explored each-others' notions, recognised opportunities, applied fresh understandings developed during lessons to new contexts and construed, from interactive experiences, an abstract concept such as evolution.

**INSERT HERE : TABLE 2 : A frequency table illustrating the extent to which it was possible to analyse different forms of data collected from questionnaires, group interviews, transcripts of audio recordings and a whole class video for evidence of aspects of a social constructivist view of learning.**

**Alternate text : A frequency table illustrating the extent to which it was possible to analyse different forms of data collected from questionnaires, group interviews, transcripts of audio recordings and a whole class video for evidence of aspects of a social constructivist view of learning.**

As Creswell and Cresswell (2018, p. 215) argue, a mixed methods approach, resonates with the desire for a more comprehensive understanding of a complex phenomena (in this case, that of young pupils coming to understand a complex scientific concept). McGregor, Frodsham and Wilson (2020) demonstrate how collecting a range of different forms of data are essential to understanding the complexities of learning processes from both teacher and learner perspectives, as well as, observers in classrooms. Beyond simply applying a single research method, the mixed methods approach enabled us, as researchers, to elicit pupils' voices and explore both the extent and nature of learning processes that enabled them to understand evolution.

## **Conclusion**

There is a clear need to protect young people who are generally perceived as 'vulnerable' in school-based research (Farrimond 2017, p. 73). It is also most appropriate that University Research Ethics Committee (UREC) require detailed applications that are clearly justified if researchers have designed an ethnographic approach focused on eliciting conceptual understanding, dialogue, gestures and interaction. Without the more sophisticated research approach adopting mixed methods, it is not possible to evidence:

- i. how pupils respond to the many and different ways that teachers support learning in lessons
- ii. the interactive nature of learning as it arises naturalistically

- iii. which activities in particular support pupils' understanding of concepts, in this case the challenging concept of evolution.

Persistence and perseverance are therefore needed to pursue justifying to the Ethics Committee that employing different data collection tools elicit juxtaposed perspectives of events or happenings. In this case persisting with capturing digital evidence that included both action and talk of individual young people was crucial to research their participatory activity and development of their understanding of challenging ideas in primary science education.

In grappling with (as well as persisting and persevering with) the ethical processes, researchers are engaged (hermeneutically) with honing and focusing their efforts to accurately (and empirically) gather data that accurately responds to the issue/s being researched.

From an ethical perspective canvassing pupils' views of something related to their lessons is generally not thought or assumed to be threatening. However, what should be borne in mind is that more straight-forward research methods, like questionnaires, are limited in the nature of data that they elicit, especially if researchers are more concerned with investigating how young pupils as active social agents, inter-act and articulate thoughts within their cultural settings (Dockett *et al*, 2009).

As researchers of children within these settings, we must remain cognisant of the ethical dilemmas and tensions that underpin our actions (Graham and Fitzgerald, 2010) to avert pupil discomfort in learning situations. In viewing pupils, not as passive participants, but as social actors, playing an active part and ensuring their voices are heard in participatory research (Powell and Smith, 2009), will inform how researchers should pay attention to research designs and ethical approval applications. Of paramount importance, though, is to equitably collate learners' voices and endeavour to present their perspectives in a balanced and unbiased way.

### **Acknowledgements**

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### **References**

- BERA's Ethical Guidelines for Educational Research, fourth edition (2018) [online] available at: <https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018-online> (accessed 28th September 2018).
- Blumer, H. (1969) *Symbolic Interactionism: Perspective and Method*. Englewood Cliffs: Prentice-Hall.
- Bruner, J.S. (1996) *The Culture of Education*. Cambridge, Mass.: Harvard University Press.
- Cohen, L., Manion, L., & Morrison, K. (2018) *Research Methods in Education*. 8<sup>th</sup> Edition. London: Routledge.
- Cresswell, J. W. & Cresswell, J. D. (2018) *Research Design. Qualitative, Quantitative & Mixed Methods Approaches*. London : Sage

- Darwin, C. (1877) *The various contrivances by which orchids are fertilised by insects*. 2nd Edition. New York: D Appleton & co. doi: 10.5962/bhl.title.
- Davies, D., Howe, A., Fasciato, M., & Rogers, M. (2004) *How do Trainee Primary Teachers Understand Creativity?* Paper presented at the DATA International Research Conference 2004: Creativity and Innovation Loughborough.
- Derry, S. J., Pea, R. D., Barron, B., Engle, R. A., Erickson, F., Ricki, G., & Sherin, B. (2010). Conducting video research in the learning sciences: guidance on selection, analysis, technology, and ethics. *Journal of the Learning Sciences*, 19, 3–53.
- Dockett, S., Einarsdottir, J. & Perry, B. (2009) *Researching with Children: Ethical Tensions. Early Childhood Research*. 7(3) p.283-298
- Farrimond, H. (2017) The Ethics of Research. In D. Wyse, N. Selwyn, E. Smith and L. Suter (eds) *The BERA/SAGE Handbook of Educational Research*. London : SAGE
- Graham, A. & Fitzgerald, R. (2010) Children’s Participation in Research: Some Possibilities and constraints in the current Australian research environment. *Journal of Sociology* 42 (2) p133-147.
- Griggs, G., & McGregor, D. (2012). Scaffolding and mediating for creativity: suggestions from reflecting on practice in order to develop the teaching and learning of gymnastics. *Journal of Further and Higher Education*, 36(2), 225–241.
- Hamlyn, R., Matthews, P., & Shanahan, M. (2017) *Young people’s views on science education*. Available at <https://wellcome.ac.uk/sites/default/files/science-education-tracker-report-feb17.pdf> (Accessed 20.12.17).
- Johnston, J. (2007) What is creativity in science education. In A. Wilson (Ed.), *Creativity in Primary Education* (2nd ed., pp 77-93). Exeter: Learning Matters Ltd.
- Leonard, S., Lamb, H., Howe, P., & Choudhoury, A. (2017) ‘*State of the nation’ report of UK primary science education*. Available at <https://wellcome.ac.uk/sites/default/files/state-of-the-nation-report-of-uk-science-education.pdf> (Accessed 20.12.17)
- Luce, M. R., & Hsi, S. (2014) Science-Relevant Curiosity Expression and Interest in Science: An Exploratory Study. *Science Education*, 99(1), 70-97.
- Malinowski, B. (1922). *Argonauts of the Western Pacific: An Account of Native Enterprise and Adventure in the Archipelagoes of Melanesian New Guinea*. London: Routledge.
- Mannay, D. (2016) *Visual, Narrative and Creative Research Methods*. London : Routledge
- McGregor, D. (2007) *Developing Thinking Developing Learning: A Guide to Thinking Skills in Education*. Maidenhead: Open University Press.
- McGregor, D., Precious, W., & Rezzano, J. (2013) *Dramatic Science*. Retrieved from <https://www.pstt-cpd.org.uk/ext/cpd/dramatic-science/index.html> (Accessed 30.10.17)
- McGregor, D., & Frodsham, S. (2019) ‘Epistemic insights : Contemplating tensions between policy influences and creativity in school science’. *BERJ*. 45(4). P.770-790.
- McGregor, D., Frodsham, S. & Wilson, H. (2020) The nature of epistemological opportunities for doing, thinking and talking about science : Reflections on an effective intervention that promotes creativity. *Research and science technological education*. DOI: <https://www.tandfonline.com/doi/abs/10.1080/02635143.2020.1799778?journalCode=crst20>
- Olive, J. L. (2014). Reflecting on the Tensions Between Emic and Etic Perspectives in Life History Research: Lessons Learned [35 paragraphs]. *Forum Qualitative Sozialforschung / Forum: Qualitative Social Research*, 15(2), Art. 6 Available at <http://nbn-resolving.de/urn:nbn:de:0114-fqs140268>. Accessed 18.08.20

Powell, M. A. & Smith, A. B. (2009) Children's Participation Right in Research. *Childhood*. 16 (1) p124-142.

Sangiorgio, A. (2015) *Collaborative creativity in music education : Children's interactions in group creative music making*. Unpublished PhD thesis. Exeter : Exeter University.

Vygotsky, L. S. (1978) *Mind in society: the development of higher psychological processes*. London: Harvard University Press.

Van Mechelen, M., Baykal, G. E., Dindler, C., Eriksson, E., & Iversen, O. S. (2020) *18 Years of Ethics in Child-Computer Interaction Research: A Systematic Literature Review*. Presented at ACM Interaction Design and Children (IDC) conference 2020: London. England, 10<sup>th</sup> June 2020.

Wilson, H., & Mant, J. (2010) *Bright Ideas in Primary Science*. Retrieved from <https://www.pstt-cpd.org.uk/ext/cpd/bright-ideas/introduction-to-the-bright-ideas-time.html> (Accessed 30.10.17).

Wood, D., Bruner, J. S., and Ross, G. (1976). The role of tutoring in problem solving. *J. Child Psychol. Psychiatry* 17, 89–100.