

Epistemic Insight

THE EPISTEMIC INSIGHT DIGEST



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FACULTY OF
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PREFACE

Keynote

Championing research engaged teaching and co-creation at CCCU

The Epistemic Insight Initiative is designed to draw attention to a gap in education today - and to innovate solutions that help to address that gap.

Of all the work we do across the Initiative - it is arguably the work by our students including our student teachers that gives us the most to celebrate and talk about. From the start, the EI Initiative was set up to enable tutors and students to work together - to co-create research studies and resources that can help to test, clarify and address a gap that research says - persists in classrooms today.

We are the only university - to the best of my knowledge - that offers its students such a high profile, rich and embedded experience of being 'research engaged'. By coming here our students have an opportunity to explore together a problem that unites and affects us all - and one which is at the frontiers of research.

What does engaging with the research look like?

It's an experience that begins with our tutors introducing every student to EI and giving everyone an invitation to engage more deeply with the research. This is followed by a period of negotiation at each point in the journey - so that every student and every tutor is part of a shared conversation between us all while having the space to take the research towards the questions it generates for them and their own areas of interest.

Why have a shared research agenda - exploring one gap which supposedly exists?

We can ask our research question of every classroom, of every year group, in every school and of every curriculum subject. We can also ask it of our own experience of Big Questions and of questions that bridge disciplines, like, "How do we keep each other safe during a pandemic?" and "Is it true that you are what you eat?", "What does it mean to be anxious?" and "Can a robot own its own thoughts?"

As you look through the studies that follow - I hope you agree that here we can see the value and impact of a Faculty working together on one shared question to help to make education better.

But - what is that question - and what gap?

You'll see it explained by each of the authors in the way that most fits the research they are doing. Or - and here's the spoiler alert - if you'd like to have more of an idea before you start, here's my version to help:

The gap in education, identified through research, that motivates the Epistemic Insight Initiative:

When we teach children about knowledge through the lens of each discipline in isolation - and test their ability to recall that knowledge - we leave out conversations which draw their attention to the different types of questions we are asking and exploring in each of our knowledge domains - and to the ways that disciplines can work together on Big Questions. We can address it by proposing and evaluating changes in school or by revisiting our own understanding of what it means to 'know' and how we know what we know.

But that's the problem the way I see it - so now please read the wonderful papers in this year's Digest to explore what this gap looks like and how we can respond to it - across the range of specialisms, professions and activities we do.

Dr. Berry Billingsley

*Professor of Science Education
and Principal Investigator for the Epistemic Insight Initiative*

EDITOR'S WELCOME

Welcome to the first edition of the EI Digest (2021). It's a delight to see our first set of articles, collated and published together. There are two more editions to come. Some of us have seen previews of these papers, presented first-hand by their authors at the EI scholarship day - which was held on Friday 21st May 2021.

Thanks to the wonderful organisational skills and IT magic of Dr Lee Hazeldine and with the help of Caroline Thomas and Dr Dani Shalet this year the scholarship day took place online. The conference was designed to give students an opportunity to showcase their work from a year that was, due to the pandemic, quite difficult for many. With over 50 attendees and 20 speakers including Keynotes from Dr Lynn Revell (Faculty Director of Research), Michaela Barnard (Head of Teacher Education), Professor Bob Bowie (Director of NICER), and Professor Berry Billingsley (Director of LASAR) the conference was very successful. The sessions included the work of Primary and Secondary ITE students from multiple disciplines including but not limited to, music, dance, art, history, science, and RE.

We were also extremely delighted to have Dr. Angela Pickard's BA(Hons) Dance in Education students to perform several beautiful pieces for us. These beautifully choreographed routines combined dance and specially selected musical accompaniment to express the feelings and emotions felt by those suffering from many different types of 'invisible' disabilities. These were welcomed, as well as emotionally charged and heartfelt, additions to the day.

The scholarship day was also designed to enable our students to experience, first-hand, what presenting at an academic conference is like; as it comprised of chaired sessions, strands, and short Q and A sessions. The conference ran from 9:30 to 2:45 PM. More importantly what this day highlighted is that despite their difficulties and setbacks, our students'--with the help of their wonderful tutors--managed to produce some incredibly unique and fascinating projects, demonstrating an unrelinquished spirit, resolve, and resilience which they share with their entire cohort.

As a team we would like to send a huge thank you to all our organisers, participants, keynotes, and attendees who worked very hard to make this wonderful day possible, and through their constant support made this day a meaningful experience for everyone involved. It was this commitment that acted as the foundations and catalyst for the publication of issue 2 and 3 (to come) of The Epistemic Insight Digest. The digest will showcase presentations from the scholarship day as well as the work of student teachers, and lecturers who followed us on our EI journey this year. I hope you enjoy reading these contributions as much as I enjoyed working with students, and team members to make it all possible. I am grateful to have been given the opportunity by Prof Berry Billingsley to take on the mantle of editor from Dr Paula Stone and I look forward to bringing you, the reader, multiple issues and carrying on this wonderful tradition for issues to come.

Happy Reading,

Dr. Dani Shalet

Editor

HAVE TEACHERS DISCOVERED THE REAPPROPRIATION OF WARTIME LANGUAGE TO BE PROBLEMATIC DURING THE COVID-19 PANDEMIC?

By Matthew Crook

Acknowledgements

The completion of this project would not have been possible without the help of many different people, and I would like to use this opportunity to thank those who assisted me with this paper. First, I should like to Messrs Brown and Smith for taking part in the interviews that I assigned them both, whose responses proved invaluable to this essay. Second, I would like to extend my gratitude to my family and friends, whose support and encouragement made this paper possible. Lastly, I should like to thank those at Canterbury Christ Church University who provided their advice and guidance during the construction of this project, particularly those within the Research and Enquiry in Education (REE) department.

Introduction

The Second World War has long remained a significant point of reference during times of national emergency. This war has been analogised numerous times in recent conflicts and such themes have resurfaced once again during the COVID-19 crisis. Throughout the pandemic, various leaders and commentators have drawn on the Second World War as a point of comparison, with many people calling for a return to the solidarity and stoicism that was celebrated as a core component of the Allied victory. This research project aims to examine the potential impact of wartime analogies on students' abilities to understand the War. It will use an Epistemic Insight (Billingsley et al., 2018) approach to explore this matter, by analysing the potential impact of repurposed language through different academic perspectives. It will combine an historiographical literature examination with interview questions of both history and English teachers. This historiographical element will involve analysis of literature pertaining to student comprehension of both the War and its relationship to English language comprehension. This component will also explore the matter of why wartime language used for the pandemic risks oversimplifying or misleading people about the realities of the War. The interview questions will help this project to analyse what the current situation in schools is. For instance, it will demonstrate whether teachers have witnessed students struggling with understanding the War because of language reappropriation, and how important they consider strong terminological command to be for their respective academic fields.

What is Epistemic Insight?

Epistemic Insight (or E.I.) is an academic mechanism which enables educators and researchers to explore 'Big Questions' through two or more scholastic viewpoints. It involves the collaborations of more than one academic field, meaning that two otherwise separate disciplines can be united for the sake of exploring a topic more thoroughly. In one of the key E.I. texts, the authors posit that it aims to offer a broader perspective on 'the nature of reality and human personhood' (Billingsley et al, 2018, p.1115). It does this by asking a question, usually one which can be answered in a variety of ways, and then sets about uniting academic disciplines in order to get the most out of it. A popular example of E.I. in action is to ask the question, 'What caused the Great Fire of London in 1666?'. The natural way to explore this question is by viewing it through a history point of view, but E.I. would aim to marry history up with another academic field, such as science.

By blending these two subjects together, a more nuanced answer to the question can be engineered, enabling a response which satisfies both historians and scientists, and offers a fresh explanation for a big question.

Project Context and Research Opportunity

This project was inspired by the language and allusions used throughout the ongoing pandemic. For example, the UN Secretary General likened COVID-19 to the Second World War, and many other global leaders have done likewise, frequently using it to emphasise the scale of the crisis (BBC, 2020). This project's genesis, therefore, is owed to these analogies and the question of whether or not such discussions could impact students who are learning about the Second World War. Such allusions can be broadly conflict related, such as referring to medical professionals as being 'frontline' workers, or deliberately referential to the Second World War, particularly allusions to the 'blitz spirit' that the public ought to maintain. As is discussed in the literature review, many press commentators have rallied against such language, accusing it of insensitivity and, in some cases, of being misleading. However, not only does it risk misleading the public about the nature of the pandemic, but it could also cause confusion about the realities of the Second World War. As such, this paper has been engineered to explore this matter through the research opportunity provided by the author's first school placement. This opportunity consisted of interviewing two members of staff who provided information about the realities of teaching students history and language during the pandemic, and how they have, or intend to handle potential errors caused by the use of wartime language for the COVID-19 crisis. The decision to work with teachers, rather than students, on this question is owed to the fact that they will be able to comment on a much broader array of classroom experiences. This study also focused on teaching staff because of the COVID-19 pandemic, as staff were more readily accessible during the lockdowns than the students were, meaning that thorough research could be conducted more reliably.

Preliminary Literature Review

The preliminary literature that this project drew upon explored the question of whether wartime language should be reappropriated for the pandemic at a moralistic level. For instance, Marina Hyde quoted Deborah Orr as stating that 'the idea that illness is a character test, with recovery as a reward for the valiant, is glib to the point of insult', referring to the potential distastefulness of using wartime allusions for those suffering from diseases (Hyde, 2020, p.1). Meanwhile, Constanza Musu argued in *The Conversation* that such wartime analogies risk unintended consequences, because 'if we are "at war" for an undetermined amount of time, battle fatigue may derail all efforts' (Musu, 2020, p.1). It can also be argued that parallels between war and disease could negate the experiences of soldiers, especially those killed in combat, as it tries to draw an unfair comparison between the dangers posed by enemy fighters and a non-sentient virus. Both of these literary examples demonstrate the frequent criticisms of pandemic-era wartime language; that it offends those who have suffered from the disease and risks worsening the situation by giving the public misleading ideas about the situation. They demonstrate much of the ongoing discussion surrounding this topic, and the concerns that have been raised by both media commentators and academics.

Project Hypothesis

After exploring key literature related to the topic, a project hypothesis was developed to reflect the gathered information. The hypothesis established for this paper is the following: 'that teachers have witnessed instances of students misunderstanding key phrases (such as 'blitz spirit') because of how they have been used during the COVID-19 pandemic'. The core question that this hypothesis was built upon asks, 'do students risk being adversely affected by the use of wartime language for the pandemic when it comes to their understanding of the realities of the Second World War?'

This question is supported by three key sub-questions:

1. Do teaching staff have concerns about the use of key language and terminology within their subject areas?
2. Have staff experienced students struggling with wartime language because of how it has been reappropriated?
3. Can an Epistemic Insight approach to this hypothesis offer a more rounded understanding of the issue?
4. These questions will be explored during this essay, utilising both the aforementioned historiographical and interview question methodologies.

Historiographical Analysis

The first core part of this research project involves literature analysis, an historiography of written materials about the realities of wartime experience and the nature of historical language. Historiography, meaning the study of written works about the past, is the most apt description of this literature review as it utilises materials which discuss both the history of the Second World War, and history as a scholastic pursuit. There are many historians who have also been critical of the reuse of wartime language. For instance Arne Kislenko has argued that Second World War analogies are misleading because 'ordering from Amazon and binge-watching Netflix cannot be compared to Stalingrad' (Kislenko, 2020, p.1). Kislenko's argument reflects one of the core problems with Second World War allusions; whilst the War and the pandemic have some superficial similarities, what is required of the public in 2020 is extremely different to the perils that people faced during the 1940s.

As this project uses both historical and English language academic spheres, the historiographical element shall focus on the shifting meaning and usage of words most associated with a specific historical context. As Husbands, Kitson and Steward noted, 'history is a school subject drenched in language' and given the centrality of linguistics in both context and meaning to history, the reusage of wartime language in the current pandemic is significant to students successfully understanding the Second World War (Husbands, 2011, p32). Wartime language used during the current pandemic are extremely likely allusions to the War because 'these historical references to a global conflict that symbolized duty, unity and above all victory make sense for leaders who need to rally their countrymen' (Bristol, 2020, p.1). As such, any and all analogies to war are potentially shaping how students think about the Second World War, either through direct reference or implication.

The blitz sits as the clearest instance of students risking being misled by current pandemic terminology. This is because of the disconnect that exists between popular imagination and the reality of the blitz, with ideas of the 'blitz spirit' overlooking the tragic impact that the bombings had on many people. Historian Charlie Hall (cited in the University of Kent New Centre) describes the 'blitz spirit' as being, 'a heavily mythologised attitude of resilience, stoicism and camaraderie which ostensibly emerged during the heavy bombardment [of] British cities by the German Luftwaffe' (Wood, 2020, p.1). Themes of this 'blitz spirit' were most obviously evoked during national address issued by the Queen early in the pandemic, when she proclaimed that, 'the attributes of self-discipline, of quiet good-humoured resolve' were the sentiments to help the country through the pandemic (O'Grady, 2020, p.1). But, as Richard Overy explained, encouraging people to maintain the 'blitz spirit' that we associate with the War is deeply problematic, because 'the history of the blitz is remembered in the terms the authorities had originally wanted' rather than the reality of what occurred (Overy, 2020, p.1). Whilst there is no doubt that mass hysteria was far less of a problem than Churchill's government expected, the so-called 'blitz spirit' was still a manufactured product of the British propaganda machine. For instance, the Bethnal Green tube station tragedy serves as an example of the panic and disorderly chaos that the blitz inspired, demonstrating that the widespread, unflinching stoicism 'blitz spirit' suggests is untrue.

The National World War Two Museum offers a useful guide to teaching students about the conflict.

In their advisory page, they express that, '[the War] should not be glorified or mythologized' (The National World War Two Museum, 2017, p.1) and that to do so would risk doing students a disservice, and ultimately the mythicising of the blitz during the pandemic poses these risks. More broadly speaking, key wartime terminologies have mixed helpfulness for students when filtered through the pandemic. For instance, the current 'enemy' is COVID-19, a disease lacking malice or sentience, whilst the enemy of the Second World War was Nazism and fascism, an aggressive political movement that threatened democracies across Europe. Attempts by students to conceive of the current global 'enemy' as being akin to the 'enemy' facing international populations in the 1940s is incongruous and unhelpful; they are two wholly separate threats that require different understandings and appreciations. This is because the Axis powers and the coronavirus are completely different threats. The Nazis were sentient human beings, driven by ideology and ambition, whilst the coronavirus is simply a biological entity which lacks awareness or sentience. Whilst both pose significant threats to the global population, such threats are extremely different to one another.

Lastly, English language studies emphasise the importance of vocabulary in student understanding of a topic. For instance, Swanson, Vaughn and Wexler (2017) recommend that 'new vocabulary should be related to other words or concepts', indicating that new words need contextualisation for them to be properly understood (Swanson Vaughn and Wexler, 2017, p.2). If this is the case, then it is not unreasonable to suggest that the recontextualization of certain wartime words could hinder student understanding of their proper historical usage.

Interview Responses

It is now necessary to address the interview questions submitted to teachers of both history and English. The questions submitted were:

1. Do you think that linguistic reappropriation can be troublesome for students to handle?
2. Have you experienced instances in the classroom where students have misunderstood certain wartime phrases because of their reusage during COVID-19?
3. If you have, were these instances addressed and how so?
4. If not, how would you address students misunderstanding key historical language within the classroom because of COVID-19?

These questions enabled the staff members to discuss both theoretical elements of the hypothesis (Questions 1 and 4) and practical, where applicable (Questions 2 and 3). The teachers' names have been altered for the purpose of anonymity. Mr Brown, the English teacher, expressed his sentiment that linguistic reappropriation was something which might be familiar to students, and that it could be beneficial since 'the development of language should be encouraged'. This would suggest that the English studies perspective on the matter is that such reusage of language could benefit students, as it can make them more aware of how words and phrases have changed over time. Context, Mr Brown states, is also important. For instance, students misusing wartime language in such a way that does not reflect upon the conflict, such as saying that something had been 'blitzed' would not require intervention since such lexicon has become part of common parlance. Effectively, a key English studies perspective is that reappropriated language can benefit students as it can show them how historical terms can be developed and evolved across time. However, Mr Brown was cautious to explain that the types of historical language being appropriated by the students would demonstrate the level of correction needed. He said that, 'if I were to overhear a student comparing their detention to, let us say, the holocaust—I would rectify that and offer a suggestion as to how they are not quite the same thing'. This clarification is important, as it suggests that despite the encouragement for students to be familiar with the reuse of language, there are some instances where active intervention is necessary to prevent serious misunderstanding.

Mr Smith, the history teacher, stated that the notion of students finding reappropriated language problematic hinged on their ability. Higher-level students would likely be aware of the potentially troublesome nature of reuse, but this could be beneficial to them if teachers used this as a development opportunity 'through questioning and discussion'. Nevertheless, lower-level students may not question the reuse of such phrases and 'simply accept the parallels that are being drawn even when wrong, impacting their understanding and development'. As such, we can see the need for nuance when it comes to approaching this matter. Student experience with reappropriation would depend on their ability—higher-level students might benefit from discussions about how we use wartime language in a particular context, but lower-level students may be adversely affected by this reuse.

Since he had not directly experience this kind of error, Mr Smith suggested how he would approach such incidents of analogy confusion. He said that he would encourage the student to 'apply their contextual knowledge of an event and then identify the similarities and differences'. This would enable the students to identify the nature of repurposed language under their own volition, and therefore encourage further independent thought and understanding. Mr Smith also suggests that repurposed language could be used as a strong teaching point for a history lesson, where students would be able to discuss as a class how Second World War terminology has been reappropriated for the pandemic and what the implications of this could be. This suggests that, whilst there would be potential problems caused by reused language, it could also be beneficial for higher-level students and for whole class discussions. This would invariably make the repurposing of wartime language a useful asset for a history teacher, particularly one with students desiring a more in-depth discussion of a topic.

Conclusion

Owing to the ongoing nature of the pandemic, the teachers had not experienced students struggling with the reuse of wartime language. However, they were still able to comment on the potential for problems to arise as a result of the reappropriation of wartime language. Whilst there was certainly expressions of optimism for how teachers could utilise discussions of language evolution, the history teacher did express his concerns about how lower-ability students might be adversely impacted, and it would suggest that this issue ought to be monitored within classrooms. The exploration of this hypothesis through the Epistemic Insight method meant that it had a broader scope, offering perspectives on both historical context and vocabulary. The hypothesis that this project was founded on has not yet been disproven, but it is clear that it is still too early in pandemic-era education for teachers to have had proper opportunity to witness the problems suggested. However, the concerns raised are based on strong academic writing about the importance of students properly understanding the language of their subject area, and it is an ongoing issue which will need to be investigated further. In answer to the main question that this report was founded on, it is clear that some students do risk struggling with understanding the Second World War if the terminology is muddled by ongoing events. However, the extent of this is dependent on the teachers' abilities to address these issues in classrooms, and caution should be exercised when wartime analogies are used until further investigation has been completed.

Bibliography

- BBC News. *Coronavirus: Greatest test since World War Two, says UN chief*. 2020 [online] Available at: <<https://www.bbc.co.uk/news/world-52114829>> [Accessed 14 April 2021].
- Billingsley, B, Nassaji, M., Fraser, S. and Lawson, F., 'A Framework for Teaching Epistemic Insight in Schools,' 2018. [online] Research in Science Education. Available at: <<https://link.springer.com/content/pdf/10.1007/s11165-018-9788-6.pdf>> [accessed 24 May 2021].
- Bristol, D., 'Historians to Explore Comparisons between the Covid-19 Pandemic and World War II', 2020. [online] Usm.edu. Available at: <<https://www.usm.edu/news/2020/release/historians-to-compare-pandemic-world-war-2.php>> [Accessed 14 April 2021].
- Hyde, M., 2020. *The horror of coronavirus is all too real. Don't turn it into an imaginary war* [online] the Guardian. Available at: <<https://www.theguardian.com/commentisfree/2020/apr/07/horror-coronavirus-real-imaginary-war-britain>> [Accessed 14 April 2021].
- Kitson, A., Husbands, C. and Steward, S., 2011. *Teaching and learning history 11-18*. Maidenhead, Berkshire: Open University Press McGraw-Hill Education.
- Musu, C., 2020 *War metaphors used for COVID-19 are compelling but also dangerous*. [online] The Conversation. Available at: <<https://theconversation.com/war-metaphors-used-for-covid-19-are-compelling-but-also-dangerous-135406>> [Accessed 15 April 2021].
- O'Grady, S., 2020. *Queen Elizabeth channelled blitz spirit in rare address on coronavirus – but is this generation up to the task?*. [online] The Independent. Available at: <<https://www.independent.co.uk/voices/queen-elizabeth-speech-coronavirus-uk-nhs-lockdown-boris-johnson-a9448611.html>> [Accessed 14 April 2021].
- Overy, R., 2020. *Why the cruel myth of the 'blitz spirit' is no model for how to fight coronavirus* [online] the Guardian. Available at: <<https://www.theguardian.com/commentisfree/2020/mar/19/myth-blitz-spirit-model-coronavirus>> [Accessed 15 April 2021].
- Swanson, E., Vaughn, S., and Wexler, J., 2017. *Enhancing Adolescents' Comprehension of Text by Building Vocabulary Knowledge* [online] Teaching Exceptional Children. <[swansonvaughnwexler_TECvocabulary.pdf](#)> [Accessed 15 April 2021].
- The National World War Two Museum, 'Some Preliminary Considerations when Teaching WWII History', 2017 [online] Available at: <<https://www.nationalww2museum.org/sites/default/files/2017-07/preliminary-considerations.pdf>> [Accessed 14 April 2021].
- Wood, S., 2021. *The reality of Blitz spirit during COVID-19*. [online] News Centre - University of Kent. Available at: <<https://www.kent.ac.uk/news/society/25315/expert-comment-the-reality-of-blitz-spirit-during-covid-19>> [Accessed 15 April 2021]

Addenda

Item 1: First Interview Response (Mr Brown)

Question: Do you think that linguistic reappropriation can be troublesome for students to handle?

Answer:

Not particularly, I feel like most wartime phrases have been commonplace within gaming culture – years before covid. Working in an all-boys school typically results in more students being familiar with gaming, especially on the heels of multiple national lockdowns. Regarding general linguistic reappropriation, there seems to be a trend in reclaiming words that may have been problematic and turning them into words of empowerment. For instance, queer would have been a derogatory term in past years, but it is now apart of the LGBTQ+ acronym. I think students handle linguistic reappropriation in their stride and the development of language should be encouraged.

Question: Have you experienced instances in the classroom where students have misunderstood certain wartime phrases because of their reusage during COVID-19?

Answer:

Not particularly – I feel that words such as ‘blitzed’ have joined the collective lexicon years ago. The extent of a wartime-covid link that I’ve experienced has been the comparisons between the Spanish flu and Covid.

Question: If you have, were these instances addressed and how so?

Answer:

Question: If not, how would you address students misunderstanding key historical language within the classroom because of COVID-19?

Answer:

This is highly dependent on what key historical language is being used and to what extent. If I were to overhear a student comparing their detention to, let us say, the holocaust – I would rectify that and offer a suggestion as to how they are not quite the same thing. However, if I overheard the words “blitzed” or “raid” I would not equate them with wartime terminology, as these are now common phrases used colloquially for effect. To reiterate, it is context dependant.

Item 2: Second Interview Response (Mr Smith)

REE Interview Questions

Question: Do you think that linguistic reappropriation can be troublesome for students to handle?

Answer:

For some students. I think those who are higher ability would be better placed to understand why certain phrases are being reused but would also have some awareness of the issues involved. Their understanding could be further developed through questioning and discussion. For lower ability students they may not question the use of the phrases and simply accept the parallels that are being drawn even when wrong, impacting their understanding and development.

Question: Have you experienced instances in the classroom where students have misunderstood certain wartime phrases because of their reuse during COVID-19?

Answer:

Not something I have noticed since our return to face to face teaching. Perhaps the topics we taught did not allow for it, not a great focus on the Blitz for example.

Question: If you have, were these instances addressed and how so?

Answer:

Question: If not, how would you address students misunderstanding key historical language within the classroom because of COVID-19?

Answer:

If I came across this issue, I would question the student with the aim of encouraging them to develop their own comparison to see if the term being used was appropriate or not. Through this discussion the student would have to apply their contextual knowledge of an event and then identify the similarities and differences. The other option is taking the time to allow students to identify any comparisons they have heard in the news and getting them to discuss any potential issues with a partner, before discussing as a class. To stretch the top I would take time exploring the issues around the use of the language, deeper analysis than just discussing one term at a time.

WHY IS IT NECESSARY FOR A TEACHER OF SCIENCE TO HAVE A THOROUGH UNDERSTANDING OF THE IMPORTANCE AND LIMITATION OF SCIENTIFIC OBSERVATION?

By Jasmine Wall

Section A

Observations are a “fundamental aspect of the learning process” (Ward and Roden, 2016; 35) and are therefore a key part of children’s scientific learning journey. This means it is important that teachers are aware of the significance of children undertaking observations and include many opportunities in the classroom for children to observe (DfE, 2013). Ahtee (2009;130) describes how “making observations is also the first step in doing investigations as it contains all the components of a science inquiry process”. For example, observations are one of the key process skills (Summers, Kruger and Mant, 1998) as they require children to raise questions, find practical methods to answer their questions, gather evidence, reflect upon and evaluate their findings, and draw conclusions. Thus, observations help children to develop their understanding of the world (IAP, 2010; Harlen and Qualter, 2014). Therefore, it is important for teachers to provide opportunities for children to develop their skills of scientific inquiry through observations. However, teachers should also be aware of the way in which they facilitate scientific observation by understanding what makes scientific observations distinct from general observation, and the possible limitations of such.

Notably, it is important for teachers to have a clear understanding of what makes scientific observations distinct from general observations. Children make observations daily (Gaskins and Paradise, 2010) but for these observations to be scientific the child should be encouraged to think about what they are seeing. They should use their observations to develop theories by collecting and interpreting their data (Hauray, 2002). A teacher should do more than just give children the opportunity to observe, since observations may only develop children’s skills for scientific inquiry if the child is completely engaged in the activity. This means that if the children do not find the observation to be one in which they are particularly interested, they may not be observing to their best ability during that activity (Howes, 2008), leading to them missing key aspects of scientific inquiry. Ahtee (2009;130) describes how “every statement in science is in principle open to question”, suggesting that to be an effective teacher of scientific inquiry, teachers should allow children to explore what interests them through questioning, since everything in science can be questioned. This is further supported by Harlen and Qualter (2014) who describe how a constructivist view of teaching can allow children to develop as learners, and scientists to a greater extent. Therefore, to increase children’s engagement with an observational task, teachers should attempt to make the task one which relates to children’s experiences, which is one of the first stages of exploring a phenomenon (Harlen and Qualter, 2014), and is thus of greater interest to them.

Furthermore, children will develop the ability to analyse and interpret their results if they are given the opportunity to practice observations with greater frequency (Harlen and Qualter, 2014). Initially, children may struggle to find key differences between two objects or conditions. However, as their skills develop through practice, children may start to spot differences more easily, and then can progress to identifying similarities between objects (which Ward and Roden (2016) describe as a more challenging skill for learners).

It is particularly important for teachers to be aware of the difficulties children may face during their scientific observations in lessons and assist children appropriately. For example, teachers can help to scaffold observations (which may still be necessary for some children in Year 2) by helping a child to reflect upon the most basic tool for observation: the five senses. Reminding children of their five senses prior to an observation, will mean that children are more attuned to the use of their senses during their observations and be using these senses to their maximum advantage. Furthermore, children will be exploring the object or condition in a fuller and more holistic way. Therefore, it is important for teachers to include many opportunities for children to observe in science, as this will develop their ability to work scientifically. Opportunities for scientific investigations using observation also allows children to ask and answer their own questions in a methodical, practical, and impactful way, turning their curiosity into practical solutions (Department for Education, 1995).

Notably, opportunities for children to engage with scientific observations can allow them to identify and challenge any misconceptions they may hold. For example, children might hold “naïve theories about the world” (Pine, Messer, and St. John, 2001). As a result, it is important for teachers to understand what knowledge their class has before beginning a topic lesson as this will allow teachers to quickly identify possible misconceptions. Being aware of misconceptions will make it easier for the teacher to notice if these are affecting children’s observations. However, it is not the case that throughout a lesson children’s misconceptions will always be abandoned. For example, research has shown that children may ignore evidence which contradicts their original belief (Harlen and Qualter, 2014), dismissing evidence which contradicts this belief. Nevertheless, this idea can be seen as too deterministic and can lead to teachers fearing that their students will hold onto stated misconceptions. It may also lead to teachers being concerned about the possibility that what they’re teaching will simply be dismissed by some children in the class. Karmiloff-Smith (1992) describes a more optimistic view, however, which allows teachers to positively incorporate children’s prior knowledge into scientific investigation. Karmiloff-Smith describes how children’s initial ideas about the world are often useful starting points which can be built upon and developed. This is also argued by Spekle (1991) who describes how children can develop their knowledge on a topic without abandoning their original ideas. For example, children can build upon and adapt their original beliefs, taking into account new observations and knowledge, without completely dismissing their original belief. Therefore, it is crucial for teachers to take on board a constructivist approach and establish what their class’ beliefs and ideas are, prior to starting a topic lesson. This will allow teachers to best support children’s learning holistically, incorporating prior beliefs (and possible misconceptions), in a useful rather than dismissive way. Teachers should positively encourage children in the classroom to observe scientifically in a way which may challenge their original beliefs, allowing them to explore contrasting evidence first-hand.

Within the classroom, it is important for teachers to encourage children to communicate with each other and to reflect upon their experiences (Harlen and Qualter, 2014) in order to understand the processes behind scientific observation. For example, Kuhn, Black, Keselman and Kaplan (2000) describe how children often focus on the outcome of a scientific investigation, neglecting to pay attention to the process of investigation. By including discussion between ‘talk partners’ and with the whole class, at various parts of the lesson, learners are less likely to solely focus on the outcomes of their investigation and may introduce details others have noticed (Roden, Ward and Ritchie, 2007). One way that teachers can help to encourage focusing attention on the processes of the investigation is through tracking the children’s actions visually. This can involve the teacher taking photographs throughout the process. For example, if children are growing plants in different conditions, teachers could photograph the plants at different time intervals during the experiment. This will allow children to remember the changes that have occurred since they originally saw the plant and help them notice how changes can occur slowly over time.

Furthermore, the teachers could take photographs of the children during their engagement with tasks on a school device, in line with school policy. Afterwards, the teacher could use these photographs to make a class display board, tracking the children's progress during the process of the investigation. Finally, teachers could capture any in-moment comments during initial discussion and hypothesis-making, also possibly including these in text boxes on the display board. This will aid children in tracking their actions, and help them to observe the process of causality (Smith and Reiser, 2005). In doing so, teachers are facilitating and supporting children to reflect upon the experiment and understand the role of observations as part of a process. This is crucial as teachers may view observations as a teacher-directed process rather than one which should be child-led (Haslam and Gunstone, 1996 & 1998). In enabling children to reflect and become more attuned with the whole process of their investigative observations, teachers are allowing the children to become more accountable for their discovered observations and conclusions., Haslam and Gunstone (1996 & 1998) described how the teachers who reported seeing observations as a process which was predominantly teacher-led, may have thought this due to their concerns about their ability in science. For example, some of the teachers in this study reported feelings of concern about their ability to answer all the children's questions and their subject knowledge within science being inadequate. This finding is supported by research from Timostuk (2016, p. 90). For instance, one teacher described how they would "panic if students ask me something...so I tend to avoid situations where they can surprise me... [it is] the only way I can get through the lesson." Nevertheless, to encourage effective observations which allow children to develop their understanding of the scientific process, it is important for teachers to give children the appropriate level of autonomy. Therefore, it is important that teachers are provided with further support regarding their own subject knowledge in science, and to be reassured that they do not need to be able to answer everything asked by children.

One key element of effective scientific observations refers to the ability of the observer to know how to observe in their specific discipline. For instance, Hodson (1986) describes how observation requires the observer to understand a substantial amount of theory. This is because understanding theory will allow the observer to know what to observe and how to observe it. In relation to the classroom setting, this means that children need to filter through what they observe and select what they need to pay attention to (Millar, 1989). One way this process can be supported by teachers is through ensuring that a lesson, or group of lessons about the topic are first taught to and discussed with the children before the investigation takes place. By ensuring that the children have a secure understanding of the topic prior to any observations they may complete, children will be more likely to observe in a serious way (Ahtee, 2009), and understand the significance of their observations within their discipline. For instance, Hidi, Renniger and Krapp (2004) explain that children's interest can develop progressively. So, if children are given the opportunity to thoroughly understand a topic before they are required to complete an observation, children will have more chance to develop their interest for that topic and understanding of how to relate their observations to theory. Therefore, prior discussion around the topic will allow children time to build up a bank of questions about the topic, and to be more eager to 'see for themselves'. This is supported by Harlen and Qualter (2014) who describe that the first stage of observation is for the learner to explore a topic, giving them the opportunity to make links with previous experiences. For instance, Timostuk (2016, p. 90) reports on one teacher who described that she felt a "warm flow in the classroom" during a class discussion, when the topic was one which was familiar to the children. Thus, teachers should move away from a teacher-centred method (Munck, 2007) and instead, encourage discussion when introducing a topic before the experiment and observation takes place. This will give the children the opportunity to pool ideas as a class and subsequently, learn from the other children's varying experiences. Carefully planned preparatory activities will ensure that the class will be in a confident position with their understanding and knowledge before testing their ideas scientifically.

One way which children in Key Stage 1 (particularly in Year 2) can be encouraged to develop their close observation skills is through being encouraged to complete observational, comparative drawings. For example, in a lesson involving the growth of real plants in different conditions, children can draw two different plants: one in a poor-growing condition and another in an optimum growing condition. This will encourage children to look closely at the plant, drawing what they see rather than their schema of a plant. To further focus on observational detail, the teacher may also encourage the use of scientific equipment. For example, children could use magnifying glasses, to observe the plant in a higher level of detail. This will allow children in Key Stage 1 to work scientifically during their observations, as they are able to explore the use of simple scientific equipment (DfE, 2013). Children could also use a 'peep-hole' tool. This could consist of a piece of card, with an appropriately sized hole cut out of the middle. This tool will help children to focus on a smaller area during their observations, such as a leaf, rather than seeing the whole plant all at once. Tools like this will aid children in their drawings regarding their attention to detail. Therefore, observational drawings can develop children's ability to focus on detail, an important factor in scientific investigations. Based on detailed observations, children will be better informed to make inferences based on what they have observed, crucial to children exploring methods used in scientific inquiry (Harlen and Qualter, 2014). For instance, children may observe that one plant has grown substantially taller than another. The teacher should then encourage children to draw conclusions from what they see, and describe what this could mean, thus, extending their thinking about their observations. If a plant has not successfully grown without water, for example, a child might conclude that water is therefore necessary for plants to grow and be healthy. Therefore, observational drawings can develop children's ability to work scientifically within the classroom, as they are pushed to notice similarities and differences between two conditions they may have observed to a deeper level. By doing so, they are also encouraged to make more detailed inferences and conclusions based on what they observe, challenging common misconceptions in this sector of science such as believing plants can grow without light. (Pine, Messer and St John, 2001).

Therefore, for teachers to effectively teach the skills of scientific observation in the classroom, they need to be in a position of confidence regarding their own ability to be scientific. Teachers should be confident in the principles of scientific inquiry, such as asking questions and encouraging discussion. Without the opportunity for discussion, teachers risk children not engaging with the topic, formulating less questions, and not developing their initial knowledge to such a large extent. Furthermore, rather than seeing children's misconceptions as a limitation, teachers should see these as an asset, and a starting point upon which to build (Pine, Messer and St. John, 2001). This will encourage children to use their observations to build upon their prior knowledge, rather than feeling their original thoughts are being dismissed. As a result, children will view observation as a positive way for them to practically seek answers to their own questions about the world, and conduct observations in a scientific manner.

Section B | Lesson Plan

Subject: Science

Links to the National Curriculum: Plants

Statutory requirements: "find out and describe how plants need water [and] light ... to grow and stay healthy".

Non-statutory: "setting up a comparative test to show that plants need light and water to stay healthy" (DfE, 2013, p.11)

Date: 25/11/20

Duration: 50 mins Year 2

Implications From Previous Learning / Common Misconceptions

Children will have already become familiar with the basic structure of common flowering plants in Year 1. Prior to the lesson, children will have set up a comparative test, planting mustard seeds in varying conditions: with light and water for the control plant, with light and no water, with no light and with water and with no light and no water. The teacher should take photographs of the plants at intervals of the plant's growth to support assessment (image D). They will make a prediction in their printed grid of what will happen to the mustard seeds regarding their growth in each condition. There will be room for them to later add their drawings and write a conclusion. Possible misconceptions could include believing that seed and bulbs need light, or not understanding how too much water can be damaging to the mustard seeds. Children may also struggle to notice differences between the plants (Ward and Roden, 2016).

Learning Intentions/Success Criteria

LO: To observe mustard seeds which have grown with different amounts of light and water and use my observations to determine what conditions plants need to grow and stay healthy.

LO: To record my findings through a comparative observational drawing, using this to draw my conclusions.

Success Criteria:

- The child can observe some of the differences between the plants which have grown in different conditions. For example, noting that plant 'A' is taller whereas plant 'B' is shorter. Common differences may include height, colour size or number of the leaves.
- The child draws two observational drawings, using equipment to focus on key differences between two plants. The drawing should include relevant detail, showing physical differences. For example, two drawings which include different uses of colours for the leaves.
- The child is able to write a conclusion, drawing on the group discussion and their drawings, to explain why they think these changes occurred and what this means regarding what plants need to be healthy and grow.

<p>Indicative Time Starter- 10 minutes</p>	<p>What am I going to teach? What do I want the children to learn?</p> <p>Pupils look at their predictions from the lesson before, then look at the plants which have been growing in the different conditions. The children will be recapping what their expectations for the plant's growth were.</p>	<p>How am I going to facilitate this?</p> <p>The teacher will write on the whiteboard the different key parts of the plants. For example, stem and leaves. This will help children start to compare specific and detailed differences regarding the plant.</p>
<p>5-10 minutes</p>	<p>The teacher will lead a discussion about what plants need to stay healthy, relating back to the control plant. They will encourage children to focus their ideas to relate to their previous learning of the structure of plants, including leaves and stem, and thinking about what they believe plants need to grow.</p>	<p>Some questions asked could be: "Are you surprised about what happened?", "Why do you think these changes have happened?", "Why do you think this plant's leaves may have gone like that?" and "How can this help us to work out what each different part of a plant needs?" The teacher should be encouraging questioning in a child-centred and constructivist way, eliciting children's explanations (Chin, 2007). The teacher or Assistant will complete the in-class assessment grid, tracking children's understanding in the discussion.</p>
<p>15 minutes</p>	<p>Children draw two observational drawings, comparing the control mustard seeds with the mustard seeds which grew in a different condition. They should focus on one element of the plant for this, for example, the difference between the leaves and draw one plant enlarged. Their drawing will encourage them to use their senses to closely observe. They will label the plant's differences for example 'smaller leaf'.</p>	<p>A card peephole and a magnifying glass can be provided to help students focus on one aspect of the plant in more detail. This will make it easier for children to focus on the detail of the plant, making their observations of differences easier.</p>
<p>5 minutes</p>	<p>Children will use their drawings to help them draw conclusions surrounding what their observations mean regarding what plants need to grow.</p>	<p>The teacher can prompt students which may be in the 'working towards' criteria to engage with the scientific equipment and engage the child in further open-ended questioning. These drawings and filled in individual table will later be assessed and marked in relation to Assessment for Learning (Black et al, 2003).</p>
<p>Plenary- 10 minutes</p>	<p>Children can reflect as a whole class on the differences they have observed and share their conclusions regarding their original comparative test plan.</p>	<p>By sharing observations and conclusions, children will become confident in their ability to draw conclusions and can reflect on why other people may have taken a different approach. Teacher could ask questions like "how did what you find compare with what you expected" (Roden, Ward and Ritchie, 2007 p. 181) to develop their analysis, interpretation and explaining skills. Teachers, again, should use the in-class assessment grid to assess the class' understanding and achievement of the Success Criteria.</p>

Role of adults

The adults will be used to mix the soil and vermiculite prior to the children planting the flowers (SAPS/FSC, 2016). Adults should facilitate open person-centred questioning regarding the changes that have occurred between different plants. The adults will help the children to identify what changes they see initially, and structure the discussion surrounding why these changes have occurred. For example, plants needing light to grow. Possible explanation of plants needing light may be because it gives the plant energy (only a basic explanation should be given at Year 2). Adults act as the facilitator for the children's discussion and explanations.

The adults will take the plants out of the cupboards and place them in an area which children can access and view them. The adults will provide the equipment useful for children's observational drawings, and complete various assessment throughout the lesson, and after the lesson regarding both individual, and whole class assessment.

Classroom Management

Children need to be aware of safe handling techniques and to support this, plants should be kept on the tables resting within a shallow container. Children should also be kept in small groups to look at each plant, allowing them each to have a sufficient view, without the increased risk of breaking or knocking over the plant. They will raise their hands when participating in the discussions on the carpet. Named lolly-sticks to encourage questioning from children and Dojo points to reinforce positive behaviour, work and effort.

Health and Safety

Risk: Low - Allergic reactions to plants could impact students or staff. To prevent this, the plants used will not be ones which are common for allergies. The students and staff will both wash hands after handling or touching any plants. Students should be made aware of safe handling techniques.

Risk: Low – Soil contamination could occur to students or staff if cuts and grazes are not properly cleaned and taken care of. To prevent soil contamination, cuts and grazes should be covered and hands should be washed thoroughly after handling soil. Students should be made aware of safe handling techniques.

Extension/Further Activities:

Extension Question: "Do you think that the plant [previously in a poor growing condition] will recover if it was to now be exposed to light and given water?"

Observations that can be used for Assessment Purposes:

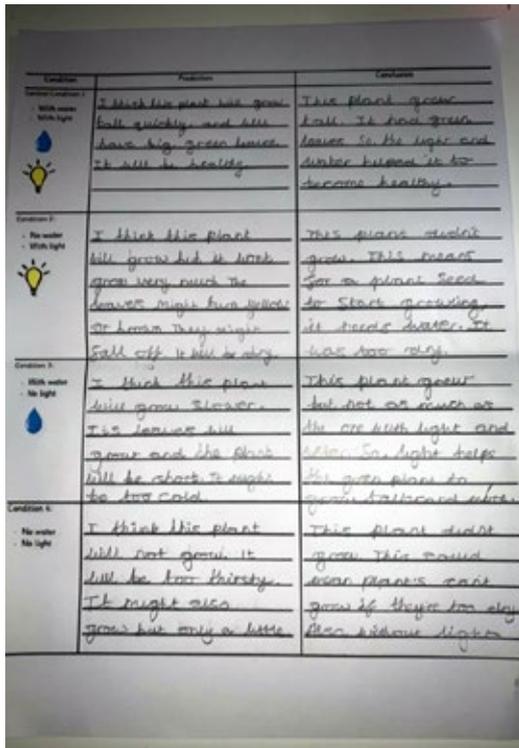


Image A

Child	Working Towards – The child is able to discuss some physical differences between the control plant and a plant in another condition.	Expected – The child is able to use their observed differences of the plants to create an observational comparative drawing, showing a clear difference on a particular characteristic.	Greater Depth – The child is able to draw on their observational comparative drawings to start formulating conclusions. They can infer what their observations mean in regard to plant's needs.
Ashleigh	/	/	/
Charlie	/	/	–
Daniel	/	/	–
Emma	/	– (Generalised drawing)	/
Ellen	/	–	–
Fiona	/	/	/
Georgia	/	–	–
George	/	–	X
Georgia	– "It isn't the same colour. It looks IP"	X	X
Harriet	/	/	/
Harvey	/	/	/
Iman	/	/	/
Imogen	/	/	/
Isabelle	/	–	–
Jack	/	/	/
Jake	/	/	/
Johanne	/	/	/
Katherine	/	/	–
Kaylin	/	/	–
Kens	/	/	/
Max	/	/	/
Megan	/	/	/
Olivia	/	/	/
Sam	/	/	/
Tegan	/	/	/
Theo	/	–	–
Thomas	/	/	/
Virginia	–	X	X
Willow	/	/	–
Xander	/	/	/

(all names are anonymised and chosen at random)

Key:
/ Achieved well
– Need to work on
X didn't achieve

Image B

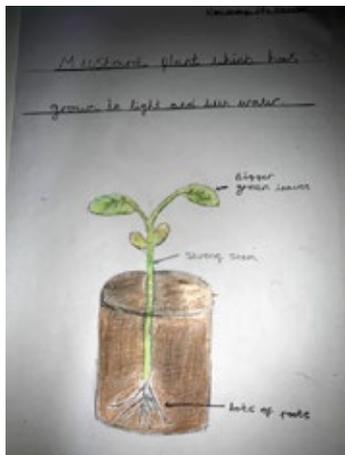


Image C: (plant not to scale)



Image[s] D

Section C | Analysis of Assessment

In order to assess children's ability to observe scientifically, different types of observations of children can be made by teachers to track their progress both individually, and as a whole class. Some of these methods can capture the learning process 'in-action' and help teachers to carry out effective assessment for learning (Earle, 2014), while others can track the extent children met aspects of the success criteria.

Furthermore, teachers should include chances for Assessment for Learning, and not just Assessment of Learning (Black et al, 2003), in order to maximise the learning potential from the assessment.

One way of assessing students during the lesson above, will involve the class teacher taking photographs of the children throughout the process of planning the experiment and carrying out the tasks. This way, the teacher can track the student's interaction with the activity over an extended period of time. The teacher could analyse the children's observational comparative drawings (as shown in image C), noting whether the child has met the success criteria. Ward and Roden (2016) describe how observational drawings can help children to spot patterns. Thus, teachers should look out for key differences between comparative drawings and annotations, to assess children's understanding. Students should also be involved within the assessment process, to encourage them to engage and learn from the assessment (William, 2011). Therefore, when marking observational drawings, teachers should include constructive feedback and comments for the children to engage with, such as asking questions for the children to answer, to further their learning.

During the lesson, children will be given a grid (shown in image A) to fill in their predictions and conclusions. Roden, Ward and Ritchie (2007) describe how it is important for children to be encouraged to compare predictions and conclusions to remind the children of the reason and purpose of their inquiry. Thus, having the 'prediction' and the 'conclusion' column next to each other, the children will be able to see a clear comparison between what they thought would happen, and what actually did happen. This will allow the teacher to infer the extent to which the child has understood their observations and used them to formulate conclusions regarding the needs of plants.

For assessment during the lesson, the class grid can be used by the teacher (image B). This grid will allow the teacher, with the help of the teaching assistant, to observe and monitor which children achieve the different aspects of the success criteria, and to what extent. This can be completed during the lesson as the grid only requires a small key symbol, and the chance to write a short comment, if necessary. Nevertheless, Turner et al (2013) describes concerns regarding teachers making reliable assessment judgements. Thus, if this grid is used throughout the school, or by different members of staff in the classroom, staff should hold moderation discussions to increase reliability through unanimous agreement about what each criteria of the grid looks like in practice (Bath Spa University School of Education, 2017), avoiding misjudgements in categorising students.

This method of observation can be used in other subjects, particularly ones involving quick-paced engagement from the whole class. Teachers may create a subsequent lesson where children recreate the growth of plants through drama, becoming taller with certain stimulus. Further to this activity, children could develop their writing ability as "drama and role-play can contribute to the quality of pupil's writing" (Department for Education, 2013 p. 21). Children could take on the perspective of a plant and describe how dark it was in the soil. This cross-curricular activity means children can consolidate learning from their observations whilst furthering their descriptive and perspective writing.

Therefore, teachers can use various methods of assessment during this planned lesson, that focus on assessment for learning, rather than purely assessment of learning. The methods of assessment can also involve different strategies for assessing children at various stages of the activity, including focusing on the process as well as assessing children's final piece of work.

Bibliography

Ahtee, M. (2009) 'Primary school student teachers' views about making observations' in *NorDiNa* 5(2), p.130.

Bath Spa University School of Education (2017) *Sarah Earle | Making Assessment More Manageable, Reliable and Valid*, Available at: https://www.youtube.com/watch?v=EezB4XinY_M (Accessed: 01/12/20).

Black, Harrison, Lee, Marshall, and Wiliam (2003) *Assessment for Learning: putting it into practice*. Matidenhead: OUP.

Chin, C. (2007) 'Teacher questioning in science classrooms: Approaches that stimulate productive thinking', *Journal of Research in Science Teaching*, 44(6)

Department for Education (2013) *English programmes of study: key stages 1 and 2, National curriculum in England*, London: HMSO, p.21, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335186/PRIMARY_national_curriculum_-_English_220714.pdf (Accessed: 04/12/20).

Department for Education (1995) *Science in the National Curriculum*, London: HMSO.

Department for Education (2013) *Science programme of study: key stages 1 and 2, National curriculum in England*, London: HMSO, p.11, Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425618/PRIMARY_national_curriculum_-_Science.pdf (Accessed 24/11/20).

Earle, S. (2014) 'Formative and summative assessment of science in English primary schools: evidence from the Primary Science Quality Mark', *Research in Science & Technological Education*, 32(2)

Gaskins and Paradise (2010) *Learning through observation in daily life*, in Lancy, Bock and Gaskins (Eds.), *The anthropology of learning in childhood*, Lanham: AltaMira Press Harlen, and Qualter (2014) *The teaching of science in primary schools*, Abingdon: Routledge.

Haslam and Gunstone (1996) 'Observation in science classes: students' beliefs about its nature and purpose', *National Association for Research in Science Teaching*, St Louis, April 1996.

Haslam, and Gunstone (1998) *The influence of teaching on student observation in science classes. Paper presented at the annual meeting of the National Association for Research in Science Teaching*, San Diego: National Association for Research in Science Teaching.

Haury, *Fundamental skills in science: Observation*, Columbus: Educational Resources Information Center.

Hidi, S., Renninger, K.A., & Krapp, A. (2004) *Interest, a motivational variable that combines affective and cognitive functioning*. In D. Y. Dai & R. J. Sternberg (Eds.), *Motivation, emotion, and cognition*, NJ: Lawrence Erlbaum.

Hodson, D. (1986) 'The nature of scientific observation'. *School Science Review*, 68 (242).

Howes, E. V. (2008) *Educative experiences and early childhood science education: A Deweyan perspective on learning to observe. Teaching and Teacher Education*, 24(3). IAP (2010) *Taking Inquiry-Based Science Education into Secondary Education: A Global Conference*, Available at: <https://www.yumpu.com/en/document/view/37386014/taking-inquiry-based-science-education-into-secondary-sazu> (Accessed: 01/12/20).

Karmiloff-Smith (1992) *Beyond Modularity: a developmental perspective on cognitive science* (Cambridge: MIT Press).

- Kuhn, D., Black, J., Keselman, A., & Kaplan, D. (2000) The development of cognitive skills to support inquiry learning. *Cognition and Instruction*, 18(4).
- Millar (1989) *What is "scientific" method, and can it be taught?* London: Routledge, In J. Wellington (Ed.) (1989), *Skills and processes in science education*, London: Routledge.
- Munck, M. (2007) Science pedagogy, teacher attitudes, and student success. *Journal of Elementary Science Education*, 19 (2).
- Pine, K., Messer, D. and St. John, K. (2001) 'Children's misconceptions in primary science: A survey of teachers' views', *Research in Science & Technological Education*, 19(1).
- Roden, Ward and Ritchie (2007) *Extending knowledge in practice: Primary science*, Exeter: Learning Matters, Chapter 12 and p. 181
- SAPS/FSC (2016) *Plants for primary pupils: Parts of a plant and their functions*, Available at: <https://www.saps.org.uk/attachments/article/1373/SAPS%20book%201%20-%20Parts%20of%20a%20Plant%20-%202016.pdf> (Accessed: 24/11/20).
- Smith, B. K. & Reiser, B. J. (2005) Explaining behavior through observational investigation and theory articulation, *The Journal of the Learning Sciences*, 14(3).
- Spekle (1991) *Physical knowledge in infancy: reflections on Piaget's theory*, New Jersey: Lawrence Erlbaum Associates in: Carey and Gelman (Eds), (1991) *The Epigenesis of Mind: Essays in Biology and Cognition*, Hillsdale: Erlbaum.
- Summers, M., Jruger, C. and Mant, J. (1998) 'Teaching electricity effectively in the primary school: a case study', *International Journal of Science Education*, 20 (2)
- Timostsuk, I. (2016) 'Primary Science Teaching - Is it Integral and Deep Experience For Students?' *Discourse and Communication for Sustainable Education*, 7, (1) p. 90
- Turner, Marshall, Farley and Harriss. (2013) *Primary Science Quality Mark: Learning from Good Practice in Primary Science*, London: Wellcome Trust.
- Ward and Roden (2016) *Teaching science in the primary classroom*, London: Sage, p. 35. Wiliam (2011) Embedded Form

USING EPISTEMIC INSIGHT, COLLABORATING PHYSICAL EDUCATION AND ART TO UNDERSTAND AND EDUCATE YEAR 7 BOYS' PERCEPTIONS OF "WHAT DOES A HEALTHY BODY LOOK LIKE, AND WHAT MAKES IT HEALTHY?"

By David Chignall

Introduction

The aim of this research is to carry out a study with year 7 boys, combining Art and Physical Education, using Epistemic Insight to understand two realms of knowledge. What the subject's perception of a healthy body looks like, and what makes them healthy, and to see if the use of Epistemic Insight would impact engagement with the core principle of the National Curriculum for PE (NCPE). The principle referenced are for children to lead healthy and active lifestyles (DfE, 2013), the current success of which will be discussed within this literature review. The significance of this research within the current educational climate is important, not only at a meso level but on a national level. At the time of writing, the United Kingdom is in its third national lockdown to stop the transmission of the COVID-19 virus, both children and adults alike have been contained to the confines of their home. Within my current PGCE placement setting at the Norton Knatchbull School, the children have been accessing lessons remotely. Over the past year, scholars within education have begun to express concern of this method of teaching, and the effects on children's physical and emotional health (Anderson, 2020; Tate 2020; Morgan, 2020), due to its lack of social interaction and the low level of physical activity for prolonged periods of time. Adequate Physical Activity (PA) levels in children have been shown to directly correlate with lower rates of childhood obesity and type 2 diabetes, higher bone mineral deposits, reduced depression and anxiety symptoms, and an increase academic attainment (Janssen & Le Blanc, 2010).

Within a world outside of the COVID-19 Pandemic, Physical Activity (PA) and meaningful Physical Education experiences highly contribute to the holistic development of a child, promoting social, cognitive, emotional, and physical development (Kirk, 1993; Laker, 2000), and their 'toolkit' to take part in lifelong PA behaviours (Harro & Riddoch, 2000). However, there is mounting evidence to suggest that children are not fulfilling the recommended amounts of PA of one hour per day (CDC, 2020). In a publication from the department for Health and Social Care in 2017, it was reported from a survey that only 23% of boys and 20% of girls are meeting the recommended time for PA (Standage et al., 2018). The National Curriculum (DfE, 2013) states children will have two hours per week of P.E within schools, meaning that the other 5 hours of activity needed in a week are the child's prerogative. However, given that health related fitness (HRF) has been part of the curriculum for over 20 years, it raises strong concerns over the efficacy of traditional HRF teaching within the NCPE. With this, the core aim of this Cross Curricular Intervention is to understand children's perceptions of health, and through a series of meaningful teaching inputs, informed by children's present knowledge in a social constructivist manor (Vygotsky, 1978). With children engaged, they will leave the series of interventions informed on the importance of physical activity and lifestyle choices to lead healthy and active lifestyles.

Meaningful Teaching of Health-Related Fitness in P.E

To describe the term 'meaningful', we must first discuss the interpretations for the word meaning within PE. Kretchmar (2007) defined meaning within this context as ""in a broad, common sense way it includes all emotions, perceptions, hopes, dreams, and other cognitions. In short, the full range of human experience" (p. 382). Beni, Fletcher and Chróinín (2016) concur with this definition, adding that the sentiment of meaning, separates it from experience of simulation within education. They go onto describe 'meaningful' educational experiences as those that hold personal significance with individuals. Kretchmar (2007) also describes different types of meanings within education, outlined by Metheny (1968), noting that connotations are interlinked with the subject's interests, feelings and emotions and inherently based on a subject's interpretation of a particular context. Beni et al (2017) summarise this notion as when individuals make sense of the past, present and future experiences, adding that this includes interactions with others, self, artifacts, content and pedagogy. This concurs with Metheny (1968) who noted making something personally meaningful as "we seize upon it, take it into ourselves, and become involved with it. This feeling of involvement is a symptom of what the idea means to us, or how we find it meaningful or significant" (p.5). However, it is important through this project and review of literature to not get confused between the terms 'meaning' and 'meaningful'. Kretchmer (2006) stresses that the term meaningful within PE relates to the meanings of personal significance, which prioritises engagement in PE with the potential to influence an individual's quality of life at an existential level. However, it is pertinent to be mindful that meaningful PE experiences are reliant on how highly the learner values PE and the learning goals they identify (Chen, 1998). Further to this, meaningfulness can derive from positive experiences within education that are satisfying, challenging, social and fun, and can positively contribute to a individuals commitment to leading a healthy and active lifestyle, as per the NCPE (Teixeira, Carraça, Markland, Silva, & Ryan, 2012). Therefore, relating back to the research inquiry within this project, it is essential that that the students find meaningfulness within the task, for material taught to positively contribute to them leading a healthy and active lifestyle.

Within HRF there is much evidence to show that these meaningful experiences lack within the current climate and directive of traditional PE. There is amounting evidence that many young people are uninspired by traditional PE teaching (Lake 2001; Smith and Parr, 2007), with students left confused with mixed messages in regard to health, fitness and activity (OFSTED, 2009, Keating et al., 2009). Harris (1997) notes that the narrative of HRF in PE is often confused and mismatched between a 'fitness for health' or a 'fitness for performance' philosophy. There have been calls for PE Teachers to have a have a blanket curriculum and professional development in teaching HRF, however there has not been much engagement as PE teachers tend to be overconfident with subject knowledge when teaching HRF, due to typically having Sport and Exercise Science academic backgrounds (Castelli & Williams, 2007; Armour and Harris, 2008).

Trout and Graber (2009) noted that in particular Overweight and Obese adolescents' experiences of PE were negative and meaningless. Adding that some felt the desire to 'become invisible' and that healthy weighted peers often perceived them as slow, weak or unskilled. Leading to disengagement and a low value of PE. Further to this Harris documented that young people often have an incomplete and inaccurate perception of HRF (OFSTED, 2004, Keating et al., 2009). Examples of misconceptions summarised by Harris (2014) include beliefs that: fitness is judged on the way someone looks, a particular exercise can burn fat in a specific area, sweating will burn off fat and that exercise is only successful when you feel worn out, such as the 'no pain, no gain' mentality. Evidence of pupil misconceptions continues through literature with Harris (2018) documenting how societal healthism discourses have caused pupils relating health to 'skinny' and 'non-fatness' body images (Harris, 1993; Placek et al., 2001; Burrows et al., 2002).

Further misconceptions extend to students poor understanding of basic PA and health principles (Kulinna, 2004). The manifestations of these misconceptions has led to pupils showing behaviours of feeling guilt from eating, denying pleasure from PA, obsessing with their body image and clear and stringent lines of what they believe to be healthy or unhealthy behaviours (Burrows & Wright, 2010).

This summarisation of misconceptions builds from Keating et al (2009), who reviewed research on students HRF knowledge over 20 years and summarised noting that there had been a lack of informed and meaningful HRF in teaching. It is therefore suggested that the discourse and schools falling short in the teaching of HRF, is a contributing factor in the demoralising statistics of young people engaging in physical activity (Harris et al., 2018; Burrows & Wright, 2010; Burrows et al., 2002).

Are Epistemic Insight Interventions the answer to making HRF in PE Meaningful?

Within this specific project, Epistemic Insight (EI) will be used as the framework to gain insight into children's held beliefs about HRF and explore any common misconceptions identified. Billingsley et al (2018) describes how the use of Epistemic Insight decompartmentalises subject knowledge realms and interacts with children beliefs, therefore making a more meaningful educational experience, and defines EI as 'knowledge about knowledge' (p.1121). Billingsley et al (2018) CITES Sosu and Gray (2012) where they envisage a landscape of education where whole-school approaches allow children to be more epistemically insightful, becoming wiser about the ways in which disciplines interact with each other, and their strengths and limitations. There is no research applying epistemic insight in PE, however common themes through literature from Billingsley et al, link to the afore mentioned discussion on the traditional teaching of HRF. When discussing barriers affecting students learning within the sciences, 'entrenched subject compartmentalisation' is mentioned. This relates back to Harris (1997) where PE teachers are stuck in either a 'fitness for health' or a 'fitness for performance' philosophy is an example, confusing teaching relationships with other disciplines, limiting the children's understanding of real world contexts (Billingsley et al., 2013). Another barrier to cross disciplinary exploration mentioned by Billingsley et al (2018) is 'a lens of oversimplification', referring to the repetitive nature of some pedagogies within a compartmentalised subject. Within HRF an example of this could be the repetitive nature of PE teachers using the Multi Activity Model (Parker & Curtner-Smith, 2005), the teaching of which only gives context within Sport and PE lessons, which children with little regard for PE may find it hard to relate to or have intrinsic motivation (Curtner-Smith, 2012).

Within a three-stage model proposed by Billingsley et al (2018). The first, allows children to make observations of the subject and construct ways to explain the observations. The second, is where children understand how these different observations interact. The third, is asking and understanding why they interact. Applying this to HRF, asking a Big Question such as "What does a healthy body look like, and what makes it healthy", would from a child's perspective allow them to make said observations based on their current knowledge. In turn this would allow the teacher to further question and address misconceptions within the subject, and plan and deliver a proceeding lesson related to the child's knowledge and interests, personalising education and making the experience meaningful. Arguably, this would also engage those who do not highly value PE. This would also allow questioning on how the now informed observations interact with each other. However, the depth of Teacher Subject knowledge and content literacy must be admirable to take a child's observations and articulate their planning and delivery to make them more informed (Savage, 2010; Vacca et al., 2011). Planned and delivered correctly, students will leave the intervention with a better understanding on health behaviours, equipping them for a factor within the reality of human personhood (Billingsley & Hazeldine, 2020).

However, Billingsley et al (2018) also describe barriers to such methods of learning being used in the modern-day educational climate, such as teachers avoiding controversial topics within subjects such as religious perceptions within science. Within this project, contentious issues such as labelling people 'overweight' or 'obese' may occur, which within the current sociological climate of 'body positivity' and 'fat shaming' debates, which are not always well informed (Cohen & Newton-John, 2020). It is issues such as these that may dampen students experiences to interact with 'Big Questions' and limit opportunities for further understandings in real world multi-disciplinary discussions.

Conclusion and Hypothesis

In conclusion, there is mounting evidence to show the short falls in the current delivery of HRF in PE. The wider societal impact of which is difficult to evidence with rates of obesity, types 2 diabetes, cardiovascular disease and coronary artery disease climbing (Knox,2012; NHS, 2018). All of which manifest and develop due to lifestyle behaviours and choices around health and PA. With this project I hypothesise that creating a meaningful intervention, children will engage with the material taught and encourage them to lead healthy and active lifestyles as per the NCPE (2013). However, one major concern around the project is teachers' abilities and educational settings ability to offset external factors, individual to a pupil's life. These factors include public health concerns such as genetics, environment and modelling family behaviours in an education culture with a finite curriculum, that is increasing focussed on attainment in core subjects, rather than educating to reduce health problems (Gard & Plum, 2014).

Bibliography

- Anderson, L., 2020. 'Smiles are infectious': What a school principal in China learned from going remote. *Edsurge*,.
- Armour, K. and Harris, J., 2008. Great expectations... and much ado about nothing? Physical education and its role in public health in England. n *Annual Meeting of the American Educational Research Association (AERA) Annual Conference*,.
- Beni, S., Fletcher, T. and Ní Chróinín, D., 2016. Meaningful Experiences in Physical Education and Youth Sport: A Review of the Literature. *Quest*, 69(3), pp.291-312.
- Billingsley, B. and Hazeldine, L., 2020. Shattering Subject Silos: Learning about big questions and epistemic insights. *Impact: The journal of the Chartered College of Teaching*,.
- Billingsley, B., Nassaji, M., Fraser, S. and Lawson, F., 2018. A framework for teaching epistemic insight in schools. *Research in Science*,.
- Billingsley, B., Taber, K., Riga, F. and Newdick, H., 2012. Secondary School Students' Epistemic Insight into the Relationships Between Science and Religion—A Preliminary Enquiry. *Research in Science Education*, 43(4), pp.1715-1732.
- Burrows, L. and Wright, J., 2010. The good life: New Zealand children's perspectives on health and self. *Sport, Education and Society*, 9(2), pp.193-205.
- Burrows, L., Wright, J. and Jungersen-Smith, J., 2002. "Measure Your Belly." New Zealand Children's Constructions of Health and Fitness. *Journal of Teaching in Physical Education*, 22(1), pp.39-48.
- Burrows, L., Wright, J. and Jungersen-Smith, J., 2002. "Measure Your Belly." New Zealand Children's Constructions of Health and Fitness. *Journal of Teaching in Physical Education*, 22(1), pp.39-48.
- Castelli, D. and Williams, L., 2007. Health-Related Fitness and Physical Education Teachers' Content Knowledge. *Journal of Teaching in Physical Education*, 26(1), pp.3-19.

- Chen, A., 1998. *Meaningfulness in Physical Education: A Description of High School Students' Conceptions*.
- Cohen, R., Newton-John, T. and Slater, A., 2020. The case for body positivity on social media: Perspectives on current advances and future directions. *Journal of Health Psychology*, p.135910532091245.
- GOV.UK. 2021. *National curriculum in England: physical education programmes of study*. [online] Available at: <<https://www.gov.uk/government/publications/national-curriculum-in-england-physical-education-programmes-of-study/national-curriculum-in-england-physical-education-programmes-of-study>> [Accessed 1 April 2021].
- Harris, J., 1997. Physical education : a picture of health? : the implementation of health-related exercise in the National Curriculum in secondary schools in England.
- Harris, J., 2014. Physical education teacher education students' knowledge, perceptions and experiences of promoting healthy, active lifestyles in secondary schools. *Physical Education and Sport Pedagogy*, 19(5), pp.466-480.
- Harris, J., Cale, L., Duncombe, R. and Musson, H., 2018. Young people's knowledge and understanding of health, fitness and physical activity: issues, divides and dilemmas. *Sport, Education and Society*, 23(5), pp.407-420.
- Hastie, P. and Curtner-Smith, M., 2011. *Sport Education*. Oxon: Routledge, p.152.
- Keating, X., Harrison, L., Chen, L., Xiang, P., Lambdin, D., Dauenhauer, B., Rotich, W. and Piñero, J., 2009. An Analysis of Research on Student Health-Related Fitness Knowledge in K-16 Physical Education Programs. *Journal of Teaching in Physical Education*, 28(3), pp.333-349.
- Kretchmar, R., 2007. *What to Do With Meaning? A Research Conundrum for the 21st Century*.
- Kulinna, P., 2004. Physical activity and fitness knowledge: How much 1-6 grade students know. *International Journal of Physical Education*,.
- Lake, J., 2001. Young People's Conceptions of Sport, Physical Education and Exercise: Implications for Physical Education and the Promotion of Health-Related Exercise. *European Physical Education Review*, 7(1), pp.80-91.
- Metheny, E., 1968. *Movement and Meaning*. New York: McGraw-Hill.
- Morgan, H., 2020. Best Practices for Implementing Remote Learning during a Pandemic. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, 93(3), pp.135-141.
- nhs.uk. 2018. *Cardiovascular disease*. [online] Available at: <<https://www.nhs.uk/conditions/cardiovascular-disease/>> [Accessed 8 April 2021].
- Office for Standard of Education (OFSTED), 2009. *Physical Education in Schools 2005/08. Working Onwards 2012 and beyond*.
- Office for Standards in Education, 2004. *The School Sport Partnerships Programme: Evaluation of Phases 3 and 4 2003/04*.
- Parker, M. and Curtner-Smith, M., 2005. Health-related fitness in sport education and multi-activity teaching. *Physical Education & Sport Pedagogy*, 10(1), pp.1-18.
- Placek, J., Griffin, L., Dodds, P., Raymond, C., Tremino, F. and James, A., 2001. Chapter 3: Middle School Students' Conceptions of Fitness: The Long Road to a Healthy Lifestyle. *Journal of Teaching in Physical Education*, 20(4), pp.314-323.
- Savage, J., 2010. *Cross-curricular teaching and learning in secondary education*. Oxon: Routledge.
- Scott Kretchmar, R., 2006. *Ten More Reasons for Quality Physical Education*.

- Smith, A. and Parr, M., 2007. Young people's views on the nature and purposes of physical education: a sociological analysis. *Sport, Education and Society*, 12(1), pp.37-58.
- Sosu, E. and Gray, D., 2012. Investigating change in epistemic beliefs: an evaluation of the impact of student teachers' beliefs on instructional preference and teaching competence. *International Journal of Educational Research*, pp.53, 80-92.
- Standage, M., Sherar, L., Curran, T., Wilkie, H., Jago, R., Davis, A. and Foster, C., 2018. Results From England's 2018 Report Card on Physical Activity for Children and Youth. *Journal of Physical Activity and Health*, 15(s2), pp.S347-S349.
- Tate, E., 2020. With weeks of e-learning ahead, be flexible and forget perfection. *Edsurge*.
- Teixeira, P., Carraça, E., Markland, D., Silva, M. and Ryan, R., 2012. *Exercise, physical activity, and self-determination theory: A systematic review*.
- Trout, J. and Graber, K., 2009. Perceptions of Overweight Students Concerning Their Experiences in Physical Education. *Journal of Teaching in Physical Education*, 28(3), pp.272-292.
- Vacca, R., Vacca, L. and Miraz, M., 2011. Content area reading: Literacy and learning across the curriculum. 10.

EFFECTIVENESS OF FORMATIVE ASSESSMENT WITH REGARDS TO SYNCHRONOUS AND ASYNCHRONOUS LESSON DELIVERY FOR REMOTE LEARNING DURING LOCKDOWN.

By Gayle Parker

Introduction

2020 created an exceptional situation within education when the Covid-19 global pandemic caused a national closure of all educational establishments in the UK from 23rd March 2020. Subsequently, at incredibly short notice, schools were obliged to create a programme of remote lesson delivery to enable the continuation of education for the nation's children.

There has been much discussion about the quality of remote teaching and the impact it has had and will continue to have on the education of children, particularly the significant gaps in learning that could be created both from lack of engagement during the remote learning periods and the subsequent impact on learning of Covid-19 classroom regulations upon return to school (Sharp et al, 2020). Debates have focused on whether lessons should be delivered live or if they should be pre-recorded and which method will maximise learning potential and engagement and promote the highest level of accessibility to learning for all students during periods of Lockdown.

This research concerns not just the lesson delivery method, but more specifically an element that according to Wiliam (2006) is fundamental to effective teaching – formative assessment – and how this is impacted by the different remote lesson delivery methods. Much focus has been given to the fact that it is important to include formative assessment during remote learning, but not whether lesson delivery method can impact the effectiveness.

This area of research is of particular interest because the subject school, an 11-18 mixed, selective Academy of Excellence in Southeast Kent, delivered a programme of learning during 'Lockdown One' that included a combination of synchronous and asynchronous lessons. During 'Lockdown Two' lesson delivery was changed to a full timetable of live, synchronous lessons as per the regular school timetable. It will be interesting to understand whether there has been a distinct difference in how teachers at this school have approached formative assessment based on the different delivery methods and whether it can be determined if one lesson delivery method can be proven to be more effective than another when considering the assessment of their students.

In this paper, the literature review will focus on the background of the importance of formative assessment within lessons and will then consider how these fits into the remote delivery methods of teaching during lockdown. The methodology will examine the justifications for the choice of research method and the ethical considerations. Key findings of the research will then be presented and scrutinised and finally summarised in the conclusion to determine whether it is possible to gauge effectiveness of formative assessment based on lesson delivery method during remote learning at this school. The paper will finish with a critical reflection of the methods and findings with ideas for future research.

Literature Review

Before presenting the research, the evolution and importance of formative assessment must be considered to give a background of the significance and relevance of this area of research.

Rosenshine (2012) recounts within his principles of instruction that checking and assessing student

understanding is a key element of the learning process. As a result, students absorb and understand the new learning and subsequently transfer it into their long-term memory. Menéndez et al (2019) report that as well as forming an essential part of the student's learning process, the evaluation of pupils should be conducted at regular points within the classroom so teachers can enhance and better the quality of education delivered to students. OECD (2005) further supports this with the idea that for this evaluation to be worthwhile there should be regular collaborative assessments of students' knowledge and comprehension to enable teachers to adapt lessons to learning requirements of students. This defines Wiliam's (2006) theory of formative assessment where information from classroom assessments is utilised to inform and plan for future learning which developed from Scriven's (1991) theory of formative evaluation first introduced in 1967.

Prior to Lockdown, as Liberman et al (2020) report, teachers relied on live and real-time classroom experiences to formatively assess students using methods such as observations of students' facial expressions, rich questioning, or simple classroom activities to check students' understanding. They add that this process of assessment had to be quickly adapted to remote learning because teachers suddenly had to understand whether students were learning as effectively as they did in the physical classroom environment.

Very few resources report on comparisons between formative assessments within synchronous or asynchronous lesson delivery formats, however Smarter Balanced (2020) use a version of Wiliam's (2006) five formative assessment strategies and adapt them to four key principles for formative assessment in remote learning – 'Clarify, Elicit, Interpret, Act' (Appendix A). According to Smarter Balanced, these four principles can all be incorporated into synchronous and asynchronous lesson delivery, however there is no mention of whether one delivery format is more effective than another for such assessment. It is hoped that this research will identify whether such an opinion can be formulated.

Methodology

This research has been conducted within an 11-18 mixed, selective Academy of Excellence in Southeast Kent with teachers from Modern Foreign Languages (MFL), Maths and Computer Science Departments to offer a link (albeit a tentative one) to the approaches used by Epistemic Insight by identifying shared commonalities and/or notable differences across subject disciplines (Billingsley and Fraser, 2018). It was decided, with the Professional Mentor, that an online Microsoft (MS) Forms survey would be the best method to conduct the research and capture the required data, incorporating one closed question and eight open questions. This was duly distributed to seven participants across these disciplines. Albudaiwi (2018) tells us that open questions should offer very individual responses that can result in profound ideas from different points of view therefore offering participants the opportunity to share unique and original ideas, a key element when embarking on research in a new area.

Research was conducted qualitatively because, as Bogdan and Biklen (1997) advise, this format should provide subjects with the freedom to express their own opinions and offer potential for more detailed responses. Siegle (2019) goes further to state that qualitative research is key within the educational sphere as it should enable the researcher to delve more deeply into the "how" and "why" of the issue or subject matter which should in turn produce more personal accounts and therefore enable the reader to apply the research to their own personal experiences.

Ethical Considerations

As Resnik (2020) advises, ethical considerations are vital to being able to work collaboratively and to gain confidence and respect from your peers, whilst maintaining impartiality and being fully accountable. Consent to conduct the research was gained from the gatekeepers – the Professional Mentor at the chosen school as well as the head of the MFL department. The research was presented

and discussed to identify any ethical considerations. Considerations that arose were a concern about adding to the workload of very overstretched members of staff due to the Covid-19 pandemic, adherence to Covid-19 regulations and confidentiality. These were all addressed by conducting the research via an online MS Forms survey which adhered to Covid-19 regulations by removing face to face interviews. It also considered participation time for teachers by enabling them to respond to the research at their own pace and time frame and confidentiality was provided by anonymising survey responses.

Results

The focus of this research is to try and determine whether lesson delivery format – synchronous or asynchronous – can have an impact on the effectiveness of formative assessment during periods of Lockdown remote learning by studying teachers' practice at the chosen selective establishment. After all, according to Wiliam (2006) this forms the basis of planning for future learning and Nordengren (2020) has reported formative assessment as being key for foreseeing and bridging learning gaps created because of remote learning with reduced student engagement.

Research was carried out across three disciplines – MFL, Computer Science and Maths – to ascertain whether there were any commonalities or shared practices that connected the delivery across these disciplines, this multidisciplinary look was inspired by research done by Billingsley and Fraser (2018). All questions were presented across the disciplines with regards to both lesson delivery methods to try and determine whether one method provided a more successful format than the other for formative assessment. A summary of key findings follows, with full results included in Appendix B.

All research participants confirmed in Q1 and Q2 that they delivered lessons synchronously and asynchronously with a combination of both methods during 'Lockdown One'. A breakdown of lessons is included in Appendix C. During Lockdown Two, lessons were all delivered live as per the normal school timetable. Leading educational figures have been at loggerheads with regards to which delivery method is the most effective, with Speck (2021) reporting that Gavin Williamson considers live lessons the ideal format whilst Daniel Muijs, prior head of research at Ofsted argues that they are not necessarily the best option.

Three participants across the disciplines (1 x MFL, Computer Science and Maths) in Q3 reported carrying out some form of formative assessment in all live, synchronous lessons, but only two (MFL and Maths) reported conducting formative assessments in asynchronous lessons. It would be interesting to extend questioning to find out why formative assessment was not used by all respondents during asynchronous lessons and whether this could indicate that live lessons were a more effective platform for formative assessment or if the question was not fully understood.

Many different methods of formative assessment were reported in Q4 during live lessons, but interestingly MFL used new assessment tools and technologies, whilst Maths used several existing formative assessment tools from "in-class" learning including *Hegarty Maths* and *Mr Carter Maths*.

MFL respondents reported in Q6 that there were either small, undefined minorities or definite groups (PP & SEN) of students that they did not reach with formative assessment for both lesson formats. However, Maths & Computer Science respondents reported that there were no groups, or groups, not reached. This could be a reminder that, as we are told by Hoffman Kaser (2014), familiarity and routines within the learning environment can have a positive impact on educational achievements or engagement of students. It was noted during synchronous lesson observations that all disciplines used MS Forms quizzes and MS Teams chat for formative assessment. When scrutinised about these common methods it was very interesting to discover that, whilst these methods had been reported within Q7 as being effective, due to quick and easy set up and an efficient way to increase student engagement in lessons, there was, however, a split between the two MFL respondents with regards to opinions on their effectiveness shown in Q8. One reported effectiveness due to the instant feedback

and level of competitiveness they could offer. The other MFL respondent found results not easy to retrieve or very mixed from the students. Whilst the subject school committed to an epistemic approach of sharing good and effective online practice, it would be interesting to investigate further whether this was carried out by the various disciplines across the school and to what extent these shared practices or online learning tools led to effective AFL.

Unfortunately, when asked in Q9 which lesson delivery method had proven most effective for formative assessment, respondents did not appear to understand the question. Only one participant from MFL commented that formative assessment during synchronous lessons was most effective due to higher levels of engagement, whilst the asynchronous method resulted in lower engagement in the formative assessment activities and an increased workload trying to chase students to complete the tasks. The remaining participants simply compared the delivery methods without considering formative assessment.

Conclusion

In conclusion, the expectation, following personal experience of teaching live lessons online and informal discussions about asynchronous lessons with teachers across the three disciplines at the subject school, was that synchronous lessons would prove to be more effective for formative assessment. This was due to the ability to incorporate many different and innovative technologies that engaged the students and gave real time formative assessment feedback, thus enabling learning to be adapted, even mid lesson, as well as planning to be easily informed for future learning. However, having analysed the data received, the results are in fact inconclusive and no clear hypothesis can be formulated for this research.

Whilst it was clear that the subject school used both lesson delivery formats and regularly assessed pupils formatively using many different methods during remote learning, there was not enough information or distinction between data received about the two delivery styles to determine whether formative assessment was more effective for synchronous or asynchronous lessons.

This could be due to the low number of participants who responded to the survey, or the fact that questions were asked via an online survey which took away the ability to add further explanation when required, therefore leading to some misinterpretation from the participants. During these extraordinary times, Covid-19 restrictions can impact on methods available to us for qualitative research and whilst satisfying the criteria agreed with the gatekeepers, as Jowett (2020) highlights, qualitative surveys can result in reduced rich data being generated. In order to draw a clearer conclusion, the recommendation would be to carry out interviews with the participants, rather than using online surveys, at a time when workload is not compromised as much by the Covid-19 situation in order to elicit more detailed information.

Although the results have proven to be inconclusive, this research and my reading have highlighted how essential it is to include regular formative assessment during remote learning, as is the practice in the physical classroom, as there has never been a more important time to understand the learning requirements of students when teachers cannot be with them in a physical classroom environment. It has also shown that in such extraordinary times, there should be much more potential to share practices across the disciplines and use these shared practices for a common goal – to formatively assess students to monitor their progress. Additionally, it has inspired an idea to improve and further this research area by exploring how formative assessment could help to bridge the gap both in Lockdown remote learning and in the return to the Covid-19 regulated, physical classroom.

Bibliography

- Billingsley, B., Fraser, S. Towards an Understanding of Epistemic Insight: the Nature of Science in Real World Contexts and a Multidisciplinary Arena. [Editorial]. *Res Sci Educ* 48, 1107–1113 (2018). [online] Available at: <https://doi.org/10.1007/s11165-018-9776-x>
- Bogdan, R. and Biklen, S.K., (1997). 'Qualitative research for education'. Boston, MA: Allyn & Bacon. [online] Available at: http://math.buffalostate.edu/dwilson/MED595/Qualitative_intro.pdf (Accessed 08/04/2021)
- Hoffman Kaser, C., (2014). 'Series on Highly Effective Practices—Classroom Routines'. [online] Available at: <https://www.odu.edu/content/dam/odu/col-dept/cdse/docs/4-classroom-routines.pdf> (Accessed: 10/04/2021)
- Jowett, A., (2020) 'Carrying out qualitative research under lockdown – Practical and ethical considerations'. [online] Available from LSE at: <https://blogs.lse.ac.uk/impactofsocialsciences/2020/04/20/carrying-out-qualitative-research-under-lockdown-practical-and-ethical-considerations/> (Accessed 10/04/2021)
- Liberman, J., Levin, V., Luna-Bazaldua, D. (2020). 'Are students still learning during COVID-19? Formative assessment can provide the answer', *World Bank Blogs*, 27 April. [online] Available at: <https://blogs.worldbank.org/education/are-students-still-learning-during-covid-19-formative-assessment-can-provide-answer> (Accessed: 05/04/2021).
- Menéndez, I.Y.C., Napa, M.A.C., Moreira, M.L.M. and Zambrano, G.G.V., (2019). 'The importance of formative assessment in the learning teaching process'. *International journal of social sciences and humanities*, Vol. 3: Issue 2, 238-249. [online] Available at: <https://www.neliti.com/publications/329252/the-importance-of-formative-assessment-in-the-learning-teaching-process> (Accessed: 07/04/2021)
- Nordengren, C., (2020) '3 reasons to use formative assessment in your virtual instruction—and tips on how to go about it'. *NWEA*, 7 May. [online] Available at: <https://www.nwea.org/blog/2020/formative-assessment-in-virtual-instruction/> (Accessed: 09/04/2021)
- OECD, (2005). 'Formative Assessment: Improving Learning in Secondary Classrooms'. Policy Brief, November, 1-8. [online] Available at: <http://www.oecd.org/education/cei/35661078.pdf> (Accessed: 05/04/2021)
- Resnik, D.B., (2020). 'What is ethics in research & why is it important', *National Institute of Environmental Health Sciences*, 23 December. [online] Available at: <https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm?links=false> (Accessed 08/04/21)
- Rosenshine, B., (2012). 'Principles of instruction: Research-based strategies that all teachers should know'. *American educator*, Vol. 36: Issue 1, 12-19,39. [online] Available at: https://www.aft.org/sites/default/files/periodicals/ae_spring2012.pdf (Accessed: 07/04/2021)
- Scriven, M., 1991. 'Beyond formative and summative evaluation'. *Evaluation and education: At quarter century*, 10(Part II), 19-64. [online] Available at: [file:///C:/Users/GRParker/Downloads/Beyond%20Formative%20and%20Summative%20Evaluation%20\(1\).pdf](file:///C:/Users/GRParker/Downloads/Beyond%20Formative%20and%20Summative%20Evaluation%20(1).pdf) (Accessed 07/04/2021)
- Siegle, D., (2019). 'Educational Research Basics by Del Siegle', *University of Connecticut*, 18 June [online] Available at: https://researchbasics.education.uconn.edu/qualitative_research/# (Accessed 10/04/2021)

Smarter Balanced, (2020). 'Remote Learning and the Formative Assessment Process'. [online] Available at: <https://smarterbalanced.org/remote-learning-and-the-formative-assessment-process/> (Accessed: 08/04/2021)

Speck, D., (2021). 'Live lessons are 'best' - Williamson contradicts Ofsted', TES, 18 January. [online] Available at: <https://www.tes.com/news/coronavirus-online-learning-schools-live-lessons-are-best-williamson-contradicts-ofsted> (Accessed: 07/04/2021).

Wiliam, D., (2006). 'Formative assessment: Getting the focus right'. *Educational assessment*, Vol 11: Issue 3-4, 283-289. [online] Available at: <https://www.tandfonline.com/doi/pdf/10.1080/10627197.2006.9652993?needAccess=true> (Accessed: 07/04/2021)

CONVERSATION FOR LEARNING: THE IMPACT OF COVID-19 ON PEDAGOGY

by Murray Wilkinson

Introduction and Conceptual Framework

Conversation for Learning

This short study explores the impact of the COVID-19 pandemic on secondary education in England during the 2020-21 academic year. The purpose of education in this article is understood to be the quest for the pedagogical ideal envisioned by Biesta – ‘*Bildung*’ (Biesta, 2002; 2015). *Bildung* has no equivalent word in English but can be described as the “cultivation of a person’s humanity” (Biesta, 2002, p. 378). The process of achieving *Bildung* is that of formation, which includes, but is not limited to, the transmission of knowledge. It is a social construction, in that it *becomes* through interaction in relationships (Biesta, 2002). The most recent Ofsted inspection framework (Ofsted, 2019) resonates with this formative ideal, no longer focusing only on test results but seeking a more holistic outcome for students. It follows that to achieve *Bildung* through relationships, within an educational setting, it is crucial that the interaction between participants leads to that formation. One of the key characteristics of this interaction can be called ‘conversation for learning’, a phrase used throughout this discussion to mean the discussions, debates, discourse, or disagreement that explore, embed, or enhance learning in lessons.

Dialogic Teaching

The importance of discussion in the learning process has a long pedigree in educational thinking. Robin Alexander (2008) defines discussion as an ‘open exchange of views’ (p. 3), with its educative power being the development of *how*—*not* just what—students think (Teo, 2019). These ideas build on the work of Vygostky (1962), who talks about the crucial relationship between language and thought, and Bakhtin (1981) who introduced the idea of “dialogical meaning making” (Lyle, 2008). It may be that these conversational interactions allow for individuals to *generate* the links between cognitive schema through open-ended dialogue with others. Discussion has the power, therefore, to ‘stimulate and extend students thinking’ (Alexander, 2008, p. 1). However, a key element of the dialogic process is not just talking but that all participants also practice listening and reflection. This interaction is vital to the development of understanding – dialogic teaching critiques the idea that learning happens in isolation in one individual’s brain (Teo, 2019). Teachers are encouraged by these authors to use a variety of pedagogical tools to enhance student-student conversation that include sharing ideas, listening to others, and reflecting on the shared experience.

Conversational Framework

Diana Laurillard’s Conversation Framework (Laurillard, 2007; 2012) describes the different areas of conversation within a teaching and learning setting. She shows that students’ motivations for learning are improved if they have the opportunity to discuss the application of new ideas with their teachers, but also with their peers (Laurillard, 2007). She goes on to describe the pedagogical value of conversation as the ‘reciprocal critique of ideas’ (Laurillard, 2012, p. 142). There is clearly a link between dialogic teaching and this Conversational framework – reciprocal critique implies an exchange of views. However, both require having someone who would, listen to you and to whom you can listen.

It is here that the impact of the COVID-19 pandemic can be seen. So called 'COVID-secure classrooms', and the extended period of online teaching-learning has drastically reduced the opportunity for student-student conversation and discussion. As the Department for Education guidelines show, schools are required to rearrange classrooms to minimise students facing each other (Department for Education, 2021). This physical change to classrooms serves to reinforce monologic or teacher-led style teaching. Bakhtin (Lyle, 2008) holds that if the only voice is that of the teacher, then there is no dialogic teaching, merely monologic. The dominant culture of UK classrooms is monologic teaching and the use of the triadic teaching approach known as IRE or IRF (initiation-response-evaluation/feedback) (Alexander, 2018; Roth, et al., 2011). This interaction falls short of being called discussion, and as such has limited impact on deepening the students' thinking. In contrast Bakker and colleagues' demonstration that true creative thinking is enabled through open-ended conversation, if students are drawn into a 'shared space of meaning' (Bakker, et al., 2015, p. 1057). Some teachers do this naturally, Alexander (2018) suggests that the underlying epistemological culture of a classroom will determine whether conversations for learning are more likely.

Epistemic Insight

Billingsley and Hardman describe Epistemic Insight as 'knowledge about knowledge' (Billingsley & Hardman, 2017), and is an initiative designed to challenge the tendency in secondary education to separate disciplines, especially when that siloed pedagogy leads to a mindset of entrenched compartmentalisation (Billingsley, et al., 2018; Billingsley & Hazeldine, 2020). Billingsley & Arias (2017) summarise the scholarly words associated with various subject curricula to show the overlap and shared spaces possible between disciplines within a secondary education setting.

Epistemic Insight shares the epistemological intent with dialogic teaching and *Bildung*: The quest to promote epistemic understanding beyond mere content knowledge (Billingsley, et al., 2018). We can therefore reframe Laurillard's (2012) emphasis on discussion for the Epistemic Insight context. Discussion offers a *reciprocal critique of 'norms of thought'* between disciplines, or between students who fall into disciplinary 'camps', such as 'scientism' (Billingsley, et al., 2018).

As we have already seen, Bakker et al (2015) and Alexander (2018) link the development of thinking to the act of discussion as a pedagogical tool. It follows that conversation for learning between students is vital to achieve the shared goal of Ofsted, *Bildung*, Dialogic Teaching and Epistemic Insight.

Research Question

The move to remote learning reduced the opportunity for this holistic learning. Conversations within and across disciplines are severely limited, each student accesses the remote teaching like 'spokes of a wheel', connected only via the hub, the online platform. The nature of remote learning therefore means that students lose the opportunity to explore concepts, share practice or ask questions of *each other*. Bakker et al.'s 'shared space of meaning' (2015, p. 1057) is only accessible via the teacher and teaching platform. The research question for this paper is therefore: What opportunities are there in remote teaching to use conversation to enter a shared space of meaning, between students or between disciplines?

The hypothesis is therefore that conversations for learning between students is difficult to instigate in online teaching. As Alexander points out (2018), student-student discussions are only made possible by the teacher, and so it is to teachers we must turn to explore the landscape of teaching during the pandemic.

Method

Teacher (email) interviews

Teachers from a non-selective secondary school were invited to complete a short interview via Microsoft Forms. Questions asked for teachers' perspectives on the phrase 'conversation for learning' and their use of conversation between students. The questions compared the use of conversation from before the pandemic to both remote learning and the current 'COVID-secure' classroom arrangements. Finally, teachers were asked to suggest any limitations to 'conversations for learning'¹. Eight staff completed the interview including two science, two language, three sociology and one history teacher. This breadth of disciplines allowed for some minimal comparison between approaches.

Lessons using Epistemic Insight Investigating Big Questions

Two online live lessons were planned and delivered with a year seven class in their usual science lessons. The Epistemic Insight Investigating Big Questions cards (LASAR, 2021) were used as a foundation, adapted for use online². The first lesson plan was to use an online shared whiteboard for students to write comments and respond to other comments as the questions from the IBQ card were presented. A second lesson was delivered to the same class, but a web-based message board was used to instigate some form of discussion. The students were encouraged to post and comment on other posts on the page. The two lessons provided an experiential basis for the development of the interview questions.

Results & Analysis

Results of IBQ Lessons

The two Investigating Big Questions lessons gave a key insight into the potential for online teaching to include discussion between students. Instigating conversations between students proved very difficult. Students were unwilling to use microphones, and only engaged using the text-based tools. The online whiteboard did not show any more interaction. Some students added comments to the whiteboard, but it rapidly became cluttered and illegible. A few early responses to the question, "does God control the weather?" answered that as God does not exist the answer was simply 'no'. These statements reduced the likelihood for anyone else to open the conversation more broadly and the whiteboard was closed. Some interaction continued via Microsoft Teams, but the interaction reverted to teacher-student question and answer. The second lesson included more engagement with use of an online message board (Padlet), the responses could not be considered 'conversational' as they were single responses to comments rather than a sustained mutual exchange of ideas.

Results of Teacher Interviews

Teachers interviewed expressed a range of understanding of the phrase 'conversations for learning'³. As Question A shows (Table 1), teachers said that they expect conversation within lessons to benefit the progress of students including the consolidation of knowledge, for those who participate in discussions.

1 The full list of questions is included in Appendix A.

2 The IBQ cards are included as Appendix B

3 Full responses from teachers are included in Appendix C

Question B shows the differences teachers found between teaching online and in person. Given the responses to Question A, it is unsurprising to see the physical aspects of conversations dominating. Another difference noted was the difficulty in including students who were not engaging online, who would usually be helped into the interaction. One respondent mentioned some quieter students who were more likely to engage online, but overall, differentiation was considered more difficult online.

When talking about the limitations of teaching in person under COVID regulations (Department for Education, 2021), as seen in Question C, masks were the dominant feature. Hearing students' responses and reading students' expressions were both mentioned as the root of the limitation. The physical arrangements were reported to limit the ability of students to engage in group conversations, but when those conversations were possible, they were deemed to be less valuable due to the necessarily restricted variety of conversation partners. Students cannot change seats or discuss in different groups. Similarly, teachers spoke of the limits to their own movement around the classroom impeding their ability to facilitate conversations between students.

An evaluation of similarities in responses by subject yielded the results in Table 2. The dominant phrases or words are listed for the responses about the understanding of 'conversation for learning' and the limitations presently in classrooms:

Subject	Question A: What do you understand by the term 'conversation for learning' between students?	Question C: Are there any limitations to 'conversations for learning' in current classroom arrangements?
Science (2)	Different point of view / concept	Students conversing with different students - mixing and encountering different ideas
Languages (2)	Sharing ideas/thoughts with peers	Masks
Sociology/Health & Social care (3)	Learning and knowledge	Not being able to move around / lack of groups
History (1)	To clarify and extend knowledge	Masks, reading facial expressions

Table 2: Key phrases for each subject group for Question A and Question C. The number of responses represented is indicated in brackets.

Even within this limited sample size, there are interesting subject specific differences. Science teachers appear to focus on concept and the variety of points of view encountered in conversation for learning. Languages also mention the need to share ideas with peers, but both saw masks as being a key limitation to conversations. Sociology, and Health and Social Care were grouped and shared a view that conversation for learning was about learning and knowledge. Interestingly, only Sociology teachers spoke about missing the ability to move around the classroom, themselves. The sole history respondent understood conversations to help with clarifying and extending knowledge but also shared the frustration caused by mask wearing.

Discussion

It is clear from the responses that interactions achieved online would not fall into the dialogic teaching envisioned by Bakhtin or Vygotsky (as cited by Lyle, 2008). Teachers' necessary involvement in the instigating of the interactions via Microsoft Teams Chat limits these interactions to asymmetrical 'monologic talk'. Any open-ended conversation that allows for students' thinking to develop via a 'reciprocal critique of ideas' (Laurillard, 2012) is absent from the online space. The stated link between a development of thinking and conversation (Alexander, 2018; Bakker, et al., 2015; Laurillard, 2012) suggests that the online teaching reported would not have moved beyond transmission of knowledge. It is also difficult to ascribe true conversation to the COVID-secure classroom. The limited size of this study demands caution in drawing conclusions but leads to an important question about the nature of any recovery strategy. Despite any differences between knowledge acquired by students during online teaching, these results suggest that very few students had the necessary conversational opportunities to consolidate that knowledge into the formation of new thinking.

The comparison between online and in-person teaching was intended to highlight the limitations of using conversation for learning during live online lessons. However, the reported limitations of the altered classroom environment indicates that conversation for learning is still not possible in classrooms. The impact of students wearing masks and being arranged in straight lines to avoid face-to-face contact continues to impact negatively on the possibility of a meaningful exchange of views between students. Students are not able to enter into the 'reciprocal critique of ideas' (Laurillard, 2012).

This study indicates that the hypothesis is supported: it is more difficult for conversations for learning between students to be used as a pedagogical tool. The results suggest that this is true for remote teaching and the restricted classroom arrangements in place following the 2021 lockdown.

Conversations for learning and Epistemic Insight

If the possibility of conversations for learning within individual classrooms is limited, there is even less opportunity for conversation across disciplines embedded in the Epistemic Insight initiative. However, the difference in responses across various subjects suggests that the type or method of conversation for learning adopted by different subjects is sufficiently different to warrant exploration. Epistemic Insight mentions discussion in many of the tools and projects described but the mechanism of those conversations could be made more explicit. Epistemic Insight interventions could expressly advocate for student-student conversations as a vital methodology, perhaps adopting Laurillard's (2012) Conversation Framework to ensure that the activities include listening and subsequent reflection of the ideas being shared by others. These interventions could also take account of the pre-existing 'conversation culture' of the classes involved (following Alexander, 2008), including a critique of whether the participating students experience dialogic or merely monologic teaching.

The pandemic and subsequent regulations on classrooms have brought the physical requirements of conversations to the fore. Students need space and opportunity to enter a shared space of meaning. Similarly, the role of teachers' movement around the classroom on conversations for learning and the way in which students are enabled to experience a diversity of perspective through interactions with a variety of fellow students needs to be given further consideration.

Conclusion

The move to rigid classroom arrangements and fixed seating plans under COVID-secure regulations has had a direct impact on the ability of teachers to use 'conversation for learning' in their lessons. Students are far less able to have meaningful discussions, and as a result are unable to encounter different perspectives in a mutual and reciprocal exchange of ideas and information. This limitation on a reciprocal critique thinking has a *negative impact on how rather than what students think* (Teo, 2019).

As educational institutions enter a recovery phase, the clear loss of discussion and interaction between students must be considered alongside the reduced time and efficacy of teacher contact with students. A predominance of knowledge transmission, within a recovery strategy, will not address the reduction in thinking that has likely resulted from reduced opportunity for discussion. There is therefore an opportunity for Epistemic Insight to offer a discussion based approach within a recovery strategy in order to enable and encourage the type of thinking that is only achieved through discussion and discourse.

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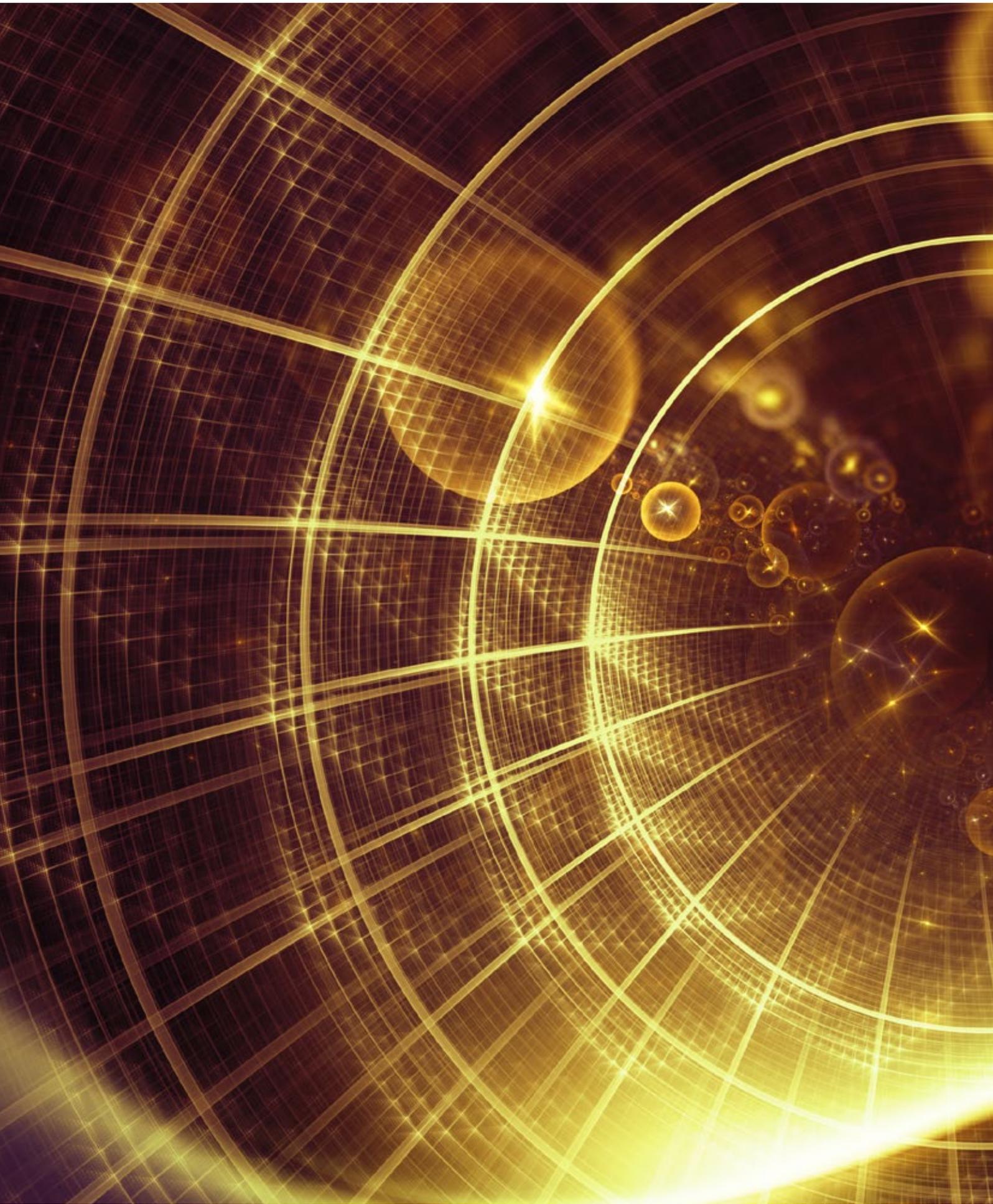
Bibliography

- Alexander, R., 2008. *Towards Dialogic Teaching: Rethinking classroom talk*. 4 ed. York: Dialogos.
- Alexander, R., 2018. Developing dialogic teaching: genesis, process, trial. *Research Papers in Education*, 33(5), pp. 561-598.
- Bakhtin, M., 1981. *The Dialogic Imagination: Four Essays by M. M. Bakhtin*. Austin, TX: University of Texas Press.
- Bakker, A., Smit, J. & Wegerif, R., 2015. Scaffolding and dialogic teaching in mathematics education: introduction and review. *ZDM Mathematics Education*, Volume 47, pp. 1047-1065.
- Biesta, G. J. J., 2002. How General Can Bildung Be? Reflections on the Future of a Modern Educational Ideal. *Journal of Philosophy of Education*, 36(3), pp. 377-390.
- Biesta, G. J. J., 2015. What is Education For? On Good Education, Teacher Judgement, and Educational Professionalism. *European Journal of Education*, 50(1), pp. 75-87.
- Billingsley, B. & Arias, A., 2017. Epistemic insight and Classrooms with Permeable Walls. *School Science Review*, 99(367), pp. 44-53.
- Billingsley, B. & Hardman, M., 2017. Epistemic insight: teaching and learning about the nature of science in real-world and multidisciplinary arenas. *School Science Review*, 98(365), pp. 57-58.
- Billingsley, B. & Hazeldine, L., 2020. Shattering the Subject Silos: Learning about the Big Questions and Epistemic Insight. *Impact, Journal of the Chartered College of Teaching*, Issue 9.
- Billingsley, B., Nassaji, M., Fraser, S. & Lawson, F., 2018. A Framework for Teaching Epistemic Insight in Schools. *Research in Science Education*, Volume 48, pp. 1115-1131.
- Department for Education, 2021. *Schools coronavirus (COVID-19) operational guidance, updated 6 April 2021*. [Online]
Available at: <https://www.gov.uk/government/publications/actions-for-schools-during-the-coronavirus-outbreak/schools-coronavirus-covid-19-operational-guidance>
[Accessed 09 April 2021].
- Kuckartz, U., 2013. Three Basic Methods of Qualitative Text Analysis.. In: *Qualitative Text Analysis: A Guide to Methods, Practice & Using Software*. London: SAGE Publications Ltd., pp. 65-120.
- LASAR, 2021. *Working across institutions to support teachers*. [Online]
Available at: <https://www.epistemicinsight.com/lasar-collaborates-with-teachers-on-our-new-research-project/>
[Accessed 11 04 2021].
- Laurillard, D., 2012. *Teaching as a Design Science: Building Pedagogical Patterns for Learning and Technology*. New York and London: Routledge.
- Laurillard, D., 2007. Pedagogical forms for mobile learning. In: N. Pachler, ed. *Mobile learning: towards a research agenda*. London: WLE Centre, IoE, pp. 153-175.
- Lyle, S., 2008. Dialogic Teaching: Discussing Theoretical Contexts and Reviewing Evidence from Classroom Practice. *Language and Education*, 22(3), pp. 222-240.
- Ofsted, 2019. *Education inspection framework for September 2019*. [Online]
Available at: assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/80
[Accessed 11 04 2021].

Roth, W.-M., Ritchie, S., Hudson, P. & Mergard, V., 2011. A study of laughter in science lessons. *Journal of Research in Science Teaching*, 48(5), pp. 437-458.

Teo, P., 2019. Teaching for the 21st century: A case for dialogic pedagogy. *Culture and Social Interaction*, Volume 21, pp. 170-178.

Vygotsky, L., 1962. *Thought and Language*. Cambridge, MA: MIT Press.





Epistemic Insight

