



Teachers' use of questions and the science/religion encounter: Basil Bernstein and the impossibility of the unthinkable

Lynn Revell¹ · Bob Bowie¹ · Mary Woolley¹ · John-Paul Riordan¹

Accepted: 8 October 2024 / Published online: 8 November 2024
© The Author(s) 2024

Abstract

This article examines the teaching of creation in a year six and a year three Religious Education (RE) class in schools in the south of England with a focus on the type and role of teacher questioning in relation to classroom discussions. The nature of knowledge, curriculum content and the relationship between RE and other subjects is currently under scrutiny and there is an ongoing debate about the negative effects of presenting science and religion as epistemically siloed. This paper presents an analysis of the way two teachers in two primary schools used questions to frame the relationship between science and religion where the aim was to minimise the polarisation of religion and science. Using Bernstein's idea of the pedagogic device and the related notions of frame, classification and the unthinkable the analysis suggests that teachers employed both visible and invisible pedagogies that limited the diversity of ideas that were considered legitimate in discussions, and which therefore influenced the nature of pupil questions and responses. We suggest that despite attempts by both teachers to diminish the strong boundaries between different types of knowledge their use of questions serves to reinforce them.

Keywords Science · Religion · Bernstein · The unthinkable · Teacher questions · Religious education

1 Introduction

Current debates about the nature of knowledge in RE and the ways in which teachers introduce pupils to different types of knowledge provide the backdrop to the analysis in this article. The way teachers use questions to frame knowledge and to structure how pupils access that knowledge is explored using Bernstein's understanding of a relationship between curriculum knowledge and pedagogy (Pluim et al., 2020). The aim of the research was to analyse the way teachers used questions to structure learning in lessons where the science/religion encounter was central to the learning.

✉ Lynn Revell
lynn.revell@canterbury.ac.uk

¹ Canterbury Christ Church University, North Holmes Rd., Canterbury, Kent, UK

The research in this article is part of a larger project exploring the science and religion encounter in the classroom (Bowie et al., 2023; Woolley et al., 2023). We define the science/religion encounter as those lessons where teachers deliberately bring together narratives, concepts and terminology from both disciplines as part of their teaching on a particular issue. The wider aim of the project was the creation of resources to support beginning teachers in the classroom but the part of the project that informs this article is focused on the analysis of teacher pedagogy and practice in RE classrooms as it relates to the science/religion encounter.

1.1 Context—wider discussions about science and religion

The relationship between science and religion is often complex and layered with multiple meanings (Geraci, 2020). The furor caused by Michael Reiss in 2008 when as Director of Education at the Royal Society he called for a more nuanced understanding of the relationship between science and religion (Baker, 2010) is echoed in the increasingly aggressive discussions about a number of other issues including abortion, trans rights and climate change (Stanley, 2023). It often appears as though there is a chasm of disagreement between those who think that the science classroom is no place to discuss religious world views like Creationism or that science should be left outside the door of the RE classroom (Bowie & Woolley, 2023). However, a close reading of the research and literature suggests that amongst scientists and theologians as well as the public there is little consensus about the exact nature of the relationship between science and faith and that perceptions of the relationships between science and religion are fluid (Astley & Francis, 2010; Spencer & Waite, 2022).

1.2 The science/religion encounter—the classroom

In contrast to the complexities that characterise broader debates about science and religion there are areas of consensus within research on the relationship between science and religion in the context of education. While there is ongoing debate on a range of issues, including augmentation and science and religion (Guilfoyle et al., 2021) and the question of epistemic insight and science and religion (Billingsley et al., 2020) there are also important areas of agreement. There is a consensus that teachers are often unprepared and unconfident when teaching subjects that bring in science and religion and that when presenting religious or scientific discourses, they are prone to caricature (Polkinghorne et al., 2014). There is some consensus, particularly in research in the UK that where the curriculum offers opportunities for science and religion intersections the exploration should be open and diverse and that pupils should be supported in engaging with the complexities of the debates (Pongsophon, 2010). There is also agreement on the ways that young people typically frame the relationship between science and religion. Research with pupils in primary and secondary phases suggest that pupils hold views on science and religion that are often polarised and pupils frequently assume that science and religion are always in conflict (Pearce et al., 2021; Stones et al., 2020). There is also broad agreement that although there is not one but many relationships between science and religion the diversity within the discussions of science and religion are rarely echoed in the classroom (Brooke, 1991; Deniz & Borgerding, 2018).

The backdrop to the research in this article are the ways teachers understand the knowledge associated with science and religion and how they manage the science/religion

encounter. Research that examines the science/religion encounter in the classroom reveals that teachers employ a range of approaches and studies have often focused on particular aspects of this intersection (Billingsley et al., 2020). Perhaps the most common focus is the area of evolution and creation but increasingly there are other areas such as cloning, nuclear energy, climate change and the question of when life begins that are now considered part of this science/religion intersection (Guilfoyle et al., 2021). More recent research has focused on the possibility of boundary crossing between science and religion (Niemela, 2020) and the ways in which pedagogies used by teachers are informed by their perceptions and understanding of the knowledge associated with each discipline. There are investigations of classroom practice that indicate what happens in the classroom is often complex and that teachers would benefit from a greater awareness of the many factors that underpin the way young people formulate their opinions in this area (Shane et al., 2016). There is also a consensus in research in this area that a pedagogical approach that is more fluid and which acknowledges the diversity of opinions within each 'camp' would provide a more meaningful and richer learning environment for pupils (Billingsley, 2016). As such there is an assumption within much of the literature that in the area of science/religion encounters in the classroom, there is a need for teachers to engage with pedagogies that permit sophisticated and nuanced understanding of the relationship between science and religion. It is this assumption, that teachers should employ pedagogies that encourage thinking and engagement that is nuanced that underpins the focus of this paper on the way teachers ask questions in lessons where a science/religion encounter takes place.

1.3 Teachers' use of questions

Although the nature of teacher questions in relation to pupil learning is an enduring topic the focus of research in this area has evolved (Willen & Clegg, 2012). Early research at the turn of the twentieth century focused on describing teachers' use of questions but by the 1950's attempts to develop functional categories of teacher talk research were dismissed as crude and research was increasingly concerned with discerning the possible relationship between teacher questions and pupil behaviour (Barnes, 1971). In the last forty years there has been a more pronounced focus on the relationship between teacher questions and their contribution to pupil progress and the nature of learning and the ability of pupils (Hargie, 1978; Tofade et al., 2013).

More recently the analysis of teachers' questions has included a focus on the relationship between dialogue and transformation on the classroom. It is recognised that authentic dialogue between teachers/tutors and pupils is essential to transformative learning and intellectual growth and that the spaces where pupils can express views that diverge from dominant narratives encourages the ability of pupils to reflect and critically engage with complex debates (Joseph, 2018; Ressler & Hodge, 2003; Twiner et al., 2021). Teacher talk is often understood as a powerful pedagogical tool that can shape how knowledge is constructed in the classroom, and which is evident in a variety of processes including, hypothesising, exploration, debate and synthesis (Hill, 2016). As Barnes describes in his review of research into teacher talk over a thirty-year period, this kind of talk is the antithesis to 'right answerism' and supports higher level thinking (Varbanova, 2018, Nystrand et al. 2003).

One finding in research on teacher talk of relevance to this study is that despite the changing focus on research into teachers' questions there is evidence that teachers' questions have changed very little (Galton et al., 2013, Tofade et al., 2013, Gall, 1970, Omari,

2018, Shanmugavel et al., 2020). Teachers are still more likely to use closed questions than any other and are less likely to use questions or prompts that are open ended or which allow unexpected answers and responses (Harrop & Swinson, 2003, Eliasson et al., 2017). From the early 1980s Robin Alexander undertook a series of investigations in English primary classrooms. He described the character of the talk in schools as ‘dispiriting’ (Alexander, 2008) and in his comparison of pedagogy across five nations Alexander found that there were possibilities of interaction and dynamic content in classroom discourse, which at the time ‘were rarely seen or heard in British classrooms’ (Alexander, 2015).

Another relevant theme in research on teacher questions is the recognition that research that examines the effects of teacher questions must move beyond a description of the questions themselves. Galton argued that classifying questions as open or closed did not accommodate teacher motive, or the possibility that teachers could respond in different ways to questions. For example, pupils could give brief factual answers to open questions that were designed to encourage open reflection, alternatively pupils could give answers that challenged the answer implied by the questions themselves (Galton et al., 2013). This echoes the earlier work of Nunn in his research on the questions asked by language teachers. He argues that although closed questions are often considered the ‘poor relation’ to the open or referential question because they are associated with a lower levels of pupil engagement and place a lower cognitive demand on pupils (Wells, 1999) they can provide opportunities for open discussion in the classroom when the teacher is able to use closed questions to structure classroom talk. (Nunn, 1999). In their work on teacher talk during the teaching of English and mathematics Smith and Higgs developed this point. Using data gathered from a large-scale research project they found that teacher responses to the questions they asked was a significant factor in the nature of classroom discussion and the quality of teacher/pupil interaction (Smith & Higgs, 2006).

It is the evidence that most teachers persist in using closed questions combined with the recommendation from research that we must acknowledge the significance of the wider interactions in the classroom that makes the work of Bernstein attractive in this context of this study. Bernstein’s model allows us to examine teacher questions not just as part of a dialogue between teacher and pupil but also as a part of wider system of rules, relationships and expectations that shape wider activity and talk in the classroom.

2 Theoretical framework

Bernstein identified a space in the landscape of classrooms where it was possible to explore what he called ‘the otherness of knowledge’, a class of knowledge that he called ‘unthinkable’. In relation to the way teachers use questions, the unthinkable is where pupils may explore worlds and realities beyond their experiences and which provide a freedom not otherwise supported by the curriculum (Young, 2014). Bernstein’s work has implications for many areas of inquiry in schools, but it is legitimate to ask how a theoretical framework developed to interrogate the relationship between social class and education is useful in the analysis of teacher questioning in science/religion encounters in the classroom.

Bernstein attempted to create a comprehensive theory of both the social and cultural contexts in which knowledge is generated and which also provides categories that allow a greater level of description of the agencies, contexts and practices that operate at the micro level of education. It is this level of detail, that allows the researcher to ‘see/reveal’ the multiple relationships played out by actors and pedagogies in a wider frame, that he refers

to as the pedagogic device, a model which explains the rules and principles that order and regulate the pedagogising of knowledge (Hasan, 2001; Singh, 2002). As such the pedagogic device can be used to examine the role of teacher's questions with what Bernstein called 'increased delicacy' (Bernstein, 2000, p. 211). It is this micro level analysis of the classroom that allows the possibility of understanding how teacher talk sits within a wider network of practice and assumptions that shape what is learnt and how it is transmitted.

Bernstein's model encompasses a theory of how knowledge regulates the structure of experience in education through a complex matrix of relationships and codes. These fields and codes regulate both what is relayed and the relay itself so that the unthinkable exists in two mutually reinforcing ways. Through the pedagogic device Bernstein observes that knowledge is not only regulated, but it also determines 'who may transmit what and to whom and under what conditions, and they attempt to set out the limits of legitimate discourse' (Bernstein, 2000, p. 31) and it is in this way that the pedagogic device regulates the unthinkable.

The notion of the unthinkable is explicitly addressed by Bernstein only occasionally in his work. However, key themes; of the control and regulation of knowledge, the emancipatory potential of education and the reproduction of knowledge, that underpin the unthinkable are evident from Bernstein's earliest writings. Bernstein distinguishes between two types of knowledge, what is thinkable or unthinkable knowledge and he characterises this distinction in various ways. The thinkable is sometimes called 'mundane', knowledge of the other or knowledge of 'how it is'. In contrast the unthinkable is referred to as esoteric, the otherness of knowledge or the 'possibility of the impossible' (Bernstein, 2000, p. 29). These categories are fluid, they describe relationships rather than fixed immutable bodies of knowledge, they differ between societies/cultures and are regulated differently at different times and in contemporary society control and management of the unthinkable lies almost wholly in the realm of education. By unthinkable, Bernstein is not referring to knowledge that society does not understand or which is taboo in some way but knowledge which is not only abstract but which relates the material world to the immaterial. This is knowledge that goes beyond boundaries, which travels between and transcends disciplines and social and cultural and academic borders. In contrast, knowledge or meanings that are thinkable are 'context bound' and 'context dependent' they are known and established in curriculums. The thinkable refers to knowledge that society will allow to be transmitted through tacit or covert means and which usually relates to already known and established outcomes (Lim, 2017).

The distinction between the thinkable and the unthinkable is central to Bernstein's work in part because the space between them is a site where power and authority can potentially be challenged. Underpinning Bernstein's work was a desire to show how inequalities were reproduced in education but also to show the potential in education for emancipation (Bourne, 2004). That potential lay not in dissolving the boundaries between subjects or forms of knowledge but in permitting pupils to acknowledge, experience and engage with the tensions between them. This process takes place in the space or gap between the thinkable and the unthinkable, it is a site that is beneficial and dangerous at the same time because it is the place where the 'yet to be thought' may happen (Bernstein, 2000, p. 30).

Understanding how the thinkable and the unthinkable work in the context of science/religion encounters at the classroom level provides opportunities for us to understand how pedagogy shapes and controls the flow of knowledge as well as the ways teachers reinforce the boundaries between official and unofficial knowledge through their use of questions. Two further parts of the pedagogic device enable us to interrogate the unthinkable in the classroom. Bernstein used the concept of the frame or framing to explain the level and

nature of control that the curriculum and teacher exert over every aspect of the lesson from its pace, content and organisation. A lesson where there was strong framing might be one where the teacher or policy dictates exactly when knowledge can be communicated and at what level and at what pace. These are lessons where the teacher/school control all aspects of the learning process at all times. A further category, classification, helps describe classroom practice. Classification refers to the way subjects are established as distinct from one another, it also alludes to the ways teachers forbid or allow different types of knowing in the classroom through deciding what is appropriate and what is not. Where classification is strong the boundaries of subjects are established and their content is 'well insulated from each other' (Bernstein, 1975, p. 88). Classification is important because it refers to the way discourses are limited within the classroom (Badger, 2010). In relation to science/religion encounters in the classroom we might expect that it would be possible to identify the extent to which the boundaries between the subjects were assumed, challenged or reinforced (classification) and also to see the extent to which the teacher encouraged or permitted pupils to engage with the legitimacy of those boundaries (framing). The degree of framing and the nature of classification would thus provide the context in which it would be possible to identify what Singh refers to as the possibility of disorder (Singh, 2002).

3 Methods

Two classes from a Church of England primary school and a community school in Kent took part in the research. The guidelines on ethics produced by the British Educational Research association (BERA, 2018) were followed. Teachers were identified through local networks and were invited to participate; formal permission was sought from Head Teachers. Teachers approached pupils to ask for their consent to participate in the research and then given reply slips for their parents or carers. Pupils also completed a consent form. The data discussed in this article is part of a larger project which uses a range of methods to collect data from schools and universities. The primary data collection method for the part of the project discussed in this article was video analysis. Both lessons were part of an intended planned existing curriculum within each school. Three video cameras were placed in the classroom (one with a 360-degree microphone attached, and another connected to a lapel microphone worn by the teacher) and the teachers were encouraged to conduct the lesson as they would in normal circumstances.

Video analysis of classroom lessons allows the researcher not only to review and revisit the same material several times, but it provides the means by which we can capture the complexities of non-verbal interactions and the way subjects respond and interact with the lesson through body language and facial expressions (Streeck, 2014). This means that speech can be contextualised and understood in relation to embedded actions and where the relationship between bodies (as well as voice) and the environment is an integral part of the data. In her discussion of the way video can be used to analysis lessons Kristensen uses the metaphor of the onion to conceptualise how video analysis can be used to unpack the layers of data within a lesson. She argues that the video recordings generate such complex, rich data that the researcher must find a way of structuring and ordering the data so that it is possible to discern the links and relationships between different layers; the body as a visible layer, talk, the environment and participant interaction and perceptions. Like an onion the layers are distinct but are also a part of the whole and if the researcher is to

understand the object as a whole then they must find a way to bring those parts together (Kristensen, 2018).

The data was coded in four ways with each set of coding a tranche of the practices and interactions that would help us identify the presence or the absence of the unthinkable. The codes linked to aspects of the lesson that could relate to features of the pedagogic device with a particular focus on teacher questions and teacher responses to classroom talk. Similar to the onion metaphor used by Kristensen we recognised that to gain a sense of the unthinkable in the lessons and to grasp the relationship between teacher questions and the nature of the science/religion encounter we needed to be able to understand the component parts as well as the lesson as a whole. Two hours of video data was analysed using aspects of Bernstein's pedagogic device (frame) to provide the coding for teachers' questions and their responses to the questions of pupils. Initial coding of the data focused on the number and the type of questions teachers asked using the distinction between referential questions, and display questions. The second round of coding distinguished between the type but also the role that referential and display questions played in the pedagogy of lessons (Nunn, 1999). A third strand of coding identified mechanisms used by the teacher to frame the lesson. These included ways in which teachers controlled or lessened their control of classroom talk, as well as pace and the nature of interactions. At this stage pedagogic tools, other than questions were considered in the coding, these included teacher gestures and body language, instructions, activities and tone of voice. The fourth layer of coding focused on evidence of classification within the lesson, these included ways in which they created or challenged boundaries between subjects.

3.1 The lessons

The two lessons were focused on the concept of Creation. The learning objective in the year six lesson was for pupils to be able to compare the Creation account as it is represented in Genesis with the account of Creation suggested by the Big Bang theory. In the previous RE lesson the class had learnt about Creation as told in Genesis through identifying what was created on each day and then in recreating this series of events through making a cartoon strip. The lesson was in three parts. At the beginning of the lesson the teacher contextualised the learning through reminding pupils, 'that in normal RE' they take a particular approach to the content, that is 'we always look at what people believe—so this is not a yes or a no, a right or a wrong—it's about belief and opinion'. Pupils are asked to explain what they understood as the Big Bang.

In the second part of the lesson the teacher drew an explicit parallel between the Big Bang and Genesis and introduced the question of 'the starting point' and the two accounts were presented as two versions of 'the event'. This section of the lesson is dedicated to establishing the parallels between the order of creation as it is told in Genesis and the order of events as they unfold in the Big Bang theory. The parallels between the two accounts were reinforced through a classroom activity where pupils were asked to match the following pairs:

Singularity: God.

The Sun: light.

Particles: water.

Animals and plants: Minerals and bacteria.

In the final part of the lesson, the teacher broke the class into small groups and asked them to recreate the Big Bang through movement.

The learning objective for the year three lesson was to understand ‘who made the world’, and ‘what we can do to look after our world’. The lesson was framed with the statement that “Christians believe that God instructed us to look after the world” and began with the display of two plants, one of which was dead and a second plant that was thriving and had been watered in the preceding two weeks. The teacher demonstrated that the dead plant could not be brought back to life through watering it. She went on to build a Lego structure and as the pupils watched she threw it on the floor and broke it. Pupils were then asked to create something in play dough and then to destroy it as a group so they could also feel what it was like to destroy something they had made themselves. The class were reminded that God made the world, and that God is also ‘unhappy with the way the world is looked after now’. The teacher led a discussion on how Christians can look after the world, the role of charities and how the Gospel reinforces this message. In the last quarter of the lesson pupils are shown the Michael Jackson musical video ‘Heal the world’ which shows images of animals that have been killed and refugees fleeing a war zone. The teacher led a whole class discussion on how the video made them feel and what they could do to help the world.

3.2 Data from the lessons

The codes used for analysing the data were chosen so that they would indicate where and how pedagogical spaces that we might characterise as ‘the unthinkable’ might be identified. We expected that lessons where framing and classification were strong and where teacher talk was dominated by closed questions would be lessons where there would be limited room for the unthinkable to take place or evolve. In this sense the four rounds of coding constituted a meta code that could be labelled as ‘the unthinkable’.

Preliminary coding of the lessons found that a significant percentage of teachers’ questions were display or closed questions rather than referential. That is teachers tended to ask questions that they already knew the answer to, and they asked questions so that pupils could display the right answer. In the Year six class 58% of all questions were closed and in the year three class 85% of the questions were closed. Secondary coding found that a greater proportion of the questions were effectively closed than first appeared; 35% of questions that presented as open or referential questions were actually display questions, and 26% of referential questions were not even questions at all as the teachers did not leave space/time in the lesson for pupils to address them. Twenty percent of all questions were rhetorical, this means that questions were asked with no expectation of an answer, either because the teacher continued to talk straight after asking the question or because the teacher ignored the raised hands of pupils and then provided the answer themselves. We found that half the questions that appeared open were ambiguous, that is they appeared to be welcoming a variety of responses, but it became clear from the teachers’ following comments that only ‘one’ answer would be acceptable.

3.3 Analysis—framing, classification and the regulation of the unthinkable.

The unthinkable, that pedagogical and structural space identified by Bernstein where there is the possibility of the impossible was not observable in either lesson (Bernstein, 2000, p. 29). The absence of the unthinkable suggests that these were classrooms where tight framing and strong classification meant that there were few opportunities for pupils

to explore questions that had not been prepared by teachers. These were lessons where every interaction between teacher and pupil was anticipated and where only a single body of knowledge was considered legitimate. These could be lessons where, epistemic injustice, the idea that only a few have the power and the language in which to challenge or engage in critical meaning making was prevalent in the planning and execution of the lessons (Fricker, 2007; Stones & Fraser-Pearce, 2022).

Analysis of the data suggests teachers used questions as part of the process of framing and classification to establish firm boundaries between science and religion throughout the lessons. Teachers used questions to control and regulate how meaning was constructed and to establish strong framing and classification, a combination which suggests that learning that is interdisciplinary and active is unlikely (Hoadley, 2006; Morais, 2002). Framing and classification are interlinked, at the micro level of the classroom framing refers to the ways control over the rules of discourses/learning, activities and pace take place and classification refers to the ways disciplines are separated. The notion of the frame can be used in different ways (Bernstein, 2018), but it can also be employed to refer to the strength of the boundary between what can be communicated and transmitted and that which is 'unthinkable' (Walford, 2002). Teachers' questions in the two classes can be understood as evaluative rules whereby pupils are made aware, explicitly and implicitly 'of how to recognise and realise the legitimate text' (Bernstein, 1996, p. 47).

Both teachers used questions as a framing tool as well as a variety of mechanisms that in Bernstein's language meant that framing was strong. The high proportion of rhetorical and closed questions meant that there was little space for pupils to raise questions that deviated from the lesson objectives. In the year six class teacher questions structured the learning so that pupils were unable to respond in ways that challenged the teacher's narrative. For example, some pupils asked questions about whether creation as it was described in Genesis really could be mapped onto the Big Bang, their questions were ignored, and they were instructed to 'stay focused'. In the year three class the teacher was overwhelmingly positive in her response to the drawings produced by pupils in the activity on their feelings and creation. Where pupils asked questions that could have disrupted her understanding of creation, pupils were ignored and in one instance asked, 'to think about that more carefully'.

Questions that appeared to be open were frequently used as strong framing devices so that pupils were discouraged from challenging subject boundaries. An example of open questions, that were not really open was the way the teacher managed the discussion of the Michael Jackson video in the year three class. After playing the video the teacher initiated a discussion with pupils about how they could help the world:

Teacher: How could we help the world?

Pupil: Stop doing wars.

Teacher: But what else?

Pupil: hmmm.

Teacher: But what else Maybe the trees?

Pupil: We could stop cutting down the trees!

Teacher: Yes, wouldn't that be wonderful, we could really make a difference if we did that, don't you think so?

A significant number of questions that were open could also be described colloquially as ‘loaded’. This meant that seemingly open questions were really invitations for pupils to present one type of answer or which implied a certain understanding. An example of this was that in the year six lesson the teacher repeatedly referred to the Genesis account of Creation as a story. She would ask pupils what they knew about the story or to recall certain aspects of the story. When it came to the Big Bang account of Creation she referred to it as ‘a theory’ and sometimes as a ‘scientific theory’. When she was asking pupils to respond to Genesis she tended to ask them how they ‘felt’ but when it came to discussion of the Big Bang she was more likely to ask them what they ‘thought’. The implication was that the Genesis account and the Big Bang account constituted different types of knowledge. Similarly, in the year six class the discussion at the beginning of the lesson on the origin of the world is bounded by the teacher’s objective that the two accounts, Genesis and the Big Bang are parallel to each other.

There was consistent use of a variety of measures that reinforced strong classification in both lessons. In the year six lesson classification often happened through a selective use and omission of information and through questions that reinforced the distinctiveness of each subject. The aim of the lesson was for pupils to consider whether Creation and Science ‘are conflicting or complimentary—that’s what we’re looking at for the rest of today’. Interestingly the lesson was presented as a learning experience where classification would be weak and there would be opportunities for pupils to explore the nature of the boundaries between the two subjects. From the beginning of the lesson the teacher asked questions that reinforced disciplinary boundaries and which made a number of assumptions about the nature of knowledge in both religion and science that pupils were never able to question. Chief among these assumptions was that science is a uniformed body of knowledge and that in religion ‘there is no right or wrong answer’. The conceptualisation of science as a body of knowledge that evolves or is contested was ignored as is the reality that within many religious communities and traditions certain beliefs or worldviews are considered correct or wrong (Moritz, 2013).

There were multiple activities, changes in pace and focus but there were few opportunities for deviation from the pedagogic intent. The dialogue and description of the teacher’s gestures below is an example of how comprehensively the year six teacher controls the discussion.

Teacher: So, this is scientists belief—so bear in mind, here in RE it’s to do with belief. So yes we’re looking at science, but it’s still belief. There’s some evidence to move towards things, but not enough to be absolute proof—OK. (she goes on to summarise the Big Bang).

Teacher: In this theory the singularity is acting in parallel to?

Pupil: God.

Teacher: Yes, God!

The teacher then explains how planets are formed.

Teacher: So thinking back, how is this parallel to our creation story?

Nobody volunteers an answer.

Teacher: Was there something that existed before?

Pupil: God?

Teacher: (Pointing to the white board where there is an image of a large earth with the sun behind it). So this was formed and this (pointing to the sun) was one of the first things to be formed—so looking over there (points to the display of the Creation story for Genesis) how does this parallel across?

Pupil: Light

Teacher: Yes, light. So one of the first things that existed in the universe (points to the whiteboard) is paralleled in the Creation story.

The strong pedagogic framing in the lesson reinforces classification because each question asked by the teacher is intended to generate an answer that will allow her to then establish a link to the theory that key events of the Big Bang are in parallel with the acts of creation as detailed in Genesis. The teacher draws on a mix of pedagogic tools, including body language, classroom displays, the whiteboard as well as her questions and then her responses to the questions to create a classroom discourse that is in effect hermetically sealed from any other meaning or knowledge that would disrupt the prescribed narrative of the lesson. The pedagogic interactions control the way and order by which meanings are constructed, in this instance the parallel relationship between science and religion.

In the year three lesson, classification was evident not only in the way the teacher used questions and her responses to questions to maintain the distinction between disciplines but in the way she reinforced those boundaries through a positive emotional response when pupils adhered to those boundaries. The regulation of disciplinary narratives through classification (Badger, 2010) was evident in the way the teacher encouraged applause and awarded praise when those discourses were adhered to and also in the way she ignored questions that could have challenged those discourses.

One further consequence of the strong framing and classification on both lessons is that the emancipatory potential of the lessons was diminished. The framing and classification in both lessons inhibited debate and curtailed the range of pupil questions. Bernstein's identification of the unthinkable as a cite of emancipation was in part informed by his belief that pupil engagement with tensions and ambiguities contributed to a capacity to think and act critically (Heimans et al., 2022). In both lessons there were instances where pupils asked questions that *could* have introduced unknown elements into the discussion or where the teacher *could* have used questions that were genuinely open. In their work, Stones and Fraser-Pearce note that the role of knowledge in RE is also a question of social justice. All children must have access to the language and concepts that allow them to make connections between disciplines or the questions which empower them to disrupt (Stones & Fraser-Pearce, 2022). Without opportunities created by teachers for the unthinkable and where the planning of lessons is dominated by strong classification and framing only some pupils will ever have access to other ways of thinking.

4 Conclusion

Bernstein was concerned with exposing the way the pedagogic device permitted access to different types of knowledge (Lim, 2017). The unthinkable is significant because it is the space where the otherness of knowledge takes place, where knowledge goes beyond boundaries, it is also significant because some pupils are denied access to this space. The

questions that teachers ask and the way they respond to the questions asked by pupils could be part of a pedagogic device that supports or denies engagement with the unthinkable but this was not evident in this research.

Many recent discussions on the science/religion encounter in classrooms are informed by the recognition that pupils are able to grapple with nuance and complex relationships between subject boundaries when the opportunity is presented to them but this was not apparent in the lessons observed in this research. These lessons were well ordered, with a varied pace, pupils were engaged and there were clear learning objectives but they were also lessons where pupils were unable to ask questions that were not anticipated by the teachers. Bernstein went so far as to argue that the pedagogical spaces where the unthinkable takes place were linked to a healthy, vibrant democracy (Bernstein, 1990). Religious Education lessons should be places where the skills and dispositions of democracy are learnt and rehearsed. The unthinkable space is not one of classroom chaos, but it is one where pupils may learn to navigate criticality and the unexpected and to challenge with curiosity and confidence. The irony is that the learning objectives for both these firmly structured lessons was to create an environment where approaches to the science/religion encounter could be expanded, but the absence of spaces that allowed ambiguity meant that pupil engagement was predetermined or to use Bernstein's phrase, 'mundane'.

In contrast to the classroom environment identified by Ressler and Hodge that encourages a divergence of views (Ressler & Hodges, 2003), these classrooms were characterised by singular narratives about the science/religion encounter and teachers used questions to shape and maintain these narratives.

Acknowledgements The research presented in this paper was made possible by a grant from the Templeton World Charity Foundation. Grant no: TWCF0375.

Declarations

Conflict of interest The authors have no conflict of interest to disclose.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Alexander, A. (2015). Dialogic pedagogy at scale: Oblique perspectives. In L. B. Resnick, C. Asterhan, & C. Clarke (Eds.), *Socialising intelligence through academic talk and dialogue* (pp. 413–423). American Educational Research Association.
- Alexander, R. (2008). Culture, dialogue and learning: Notes on an emerging pedagogy. In N. Mercer & S. Hodgkinson (Eds.), *Exploring talk in school* (pp. 91–598). Sage.
- Astley, J., & Francis, L. J. (2010). Promoting positive attitudes towards science and religion among sixth-form pupils: dealing with scientism and creationism. *British Journal of Religious Education*, 32(3), 189–200. <https://doi.org/10.1080/01416200.2010.498604>
- Badger, J. (2010). Classification and framing in the case method: Discussion leader's questions. *Journal of Further and Higher Education*, 34(4), 503–518.

- Baker, S. (2010). Creationism in the classroom: A controversy with serious consequences. *Research in Education*, 83(3), 78–88.
- Barnes, D. (1971). Language and learning in the classroom. *Journal of Curriculum Studies*, 3(1), 27–38.
- BERA. (2018). Ethical Guidelines for Educational Research. Retrieved March 2022, from <https://www.bera.ac.uk/publication/ethical-guidelines-for-educational-research-2018-online>
- Bernstein, B. (1975). Class and pedagogies: Visible and invisible. *Educational Studies*, 1(1), 23–41. <https://doi.org/10.1080/03055697500101015>
- Bernstein, B. (1990). *The structuring of pedagogic discourse*. Routledge.
- Bernstein, B. (1996). *Pedagogy, symbolic control and identity*. Rowman & Littlefield Publishers.
- Bernstein, B. (2000). *Pedagogy, symbolic control and identity*. Rowman & Littlefield Publishers Inc.
- Bernstein, B. (2018). On the classification and framing of educational knowledge. In *Knowledge, education, and cultural change* (pp. 365–392). Routledge.
- Billingsley, B. (2016). Ways to prepare future teachers to reach science in multicultural classrooms. *Cultural Studies of Science Education*, 11, 283–291.
- Billingsley, B., Abedin, M., & Nassaji, M. (2020). Primary school students' perspectives on questions that bridge science and religion: Findings from a survey study in England. *British Educational Research Journal*, 46(1), 177–204.
- Bourne, J. (2004). Framing talk. In J. Muller, B. Davies, & A. Morais (Eds.), *Reading Bernstein, researching Bernstein*. Routledge.
- Bowie, B. A., Woolley, A., Hulbert, M., Thomas, S., Revell, C., & Riordan, L. (2023). Science religion encounters, epistemic trespass, neighbourliness and overlapping domains: Theorisation and quantitative evidence of the extent. *Journal of Religious Education*, 71, 279–295.
- Bowie, B., & Woolley, M. (2023). *What are science/religion encounters and how can I prepare for them?* National Institute For Christian Education Research.
- Brooke, J. (1991). *Science and religion: Some historical perspectives*. Cambridge University Press.
- Deniz, H., & Borgerding, L. A. (Eds.). (2018). *Evolution education around the globe*. Springer.
- Eliasson, N., Karlsson, K., & Sorensen, H. (2017). The role of questions in the science classroom – girls and boys respond to teachers' questions. *International Journal of Science Education*, 39(4), 433–452.
- Fricker, M. (2007). *Epistemic injustice: Power and the ethics of knowing*. Oxford University Press.
- Gall, M. D. (1970). The use of questions in teaching. *Review of Educational Research*, 40, 707–721.
- Galton, M., Hargreaves, L., & Comber, C. (2013). Changes in patters of teacher interaction in primary classrooms: 1976–96. *British Educational Research Journal*, 25(1), 23–37.
- Geraci, R. (2020). A hydra-logical approach: Acknowledging complexity in the study of Religion, science and technology. *Journal of Religion and Science*. <https://doi.org/10.1111/zygo.12650>
- Guilfoyle, L., Erduran, S., & Park, W. (2021). In investigation into secondary teachers' views on argumentation in science and religious education. *Journal of Beliefs and Values*, 43(2), 190–204.
- Hargie, O. (1978). The importance of teacher questions in the classroom. *Educational Research*, 20(2), 99–102. <https://doi.org/10.1080/0013188780200203>
- Harrop, A., & Swinson, J. (2003). Teachers' questions in the infant, junior and secondary school. *Educational Studies*, 29(1), 49–57. <https://doi.org/10.1080/0305569030326>
- Hasan, R. (2001). Understanding talk: Directions from Bernstein's sociology. *International Journal of Social Research Methodology*, 4(1), 5–9.
- Heimans, S., Singh, P., & Kwok, H. (2022). Pedagogic rights, public education and democracy. *European Educational Research Journal*, 21(1), 71–82.
- Hill, J. (2016). Questioning techniques: A study of instructional practice. *Peabody Journal of Education*, 91(5), 660–671.
- Hoadley, U. (2006). Analysing pedagogy: The problem of framing. *Journal of Education*, 40(1), 8.
- Joseph, S. (2018). Questions teachers ask: An exploratory study of teachers' approach to questioning in the primary and Secondary classroom. *Journal of Education and Social Policy*, 5(1), 77–87.
- Kristensen, L. (2018). "Peeling an onion": Layering as a methodology to promote embodied perspectives in video analysis. *Video Journal of Education and Pedagogy*, 3(3), 1–21.
- Lim, L. (2017). Regulating the unthinkable: Bernstein's pedagogic device and the paradox of control. *International Studies in Sociology of Education*, 26(4), 353–374. <https://doi.org/10.1080/09620214.2017.1317605>
- McPhail, G. (2016). The fault lines of recontextualization: The limits of constructivism in education. *British Educational Research Journal*, 42(2), 294–313.
- Morais, A. (2002). Basil Bernstein at the micro level of the classroom. *British Journal of Sociology of Education*, 23(4), 559–569. <https://doi.org/10.1080/0142569022000038413>
- Moritz, M. (2013). God's creation through evolution and the language of scripture. *Theology and Science*, 11(1), 1–7. <https://doi.org/10.1080/14746700.2013.750958>

- Niemela, M. (2020). Crossing curricular boundaries for powerful knowledge. *The Curriculum Journal*, 32(2), 359–375.
- Nunn, R. (1999). The purpose of language teacher's questions. *The International Review of Applied Linguistics in Language Teaching*, 37, 23–42. <https://doi.org/10.1515/iral.1999.37.1.23>
- Nystrand, M. L., Wu, L., Gamoran, A., Zeiser, S., & Long, D. A. (2003). Questions in time: Investigating the structure and dynamics of unfolding classroom discourse. *Discourse Processes*, 35(2), 135–198. https://doi.org/10.1207/S15326950DP3502_3
- Omari, H. (2018). Analysis of the types of classroom questions which Jordanian English language teachers ask. *Modern Applied Science*, 12(4), 1–12. <https://doi.org/10.5539/mas.v12n4p1>
- Pearce, J., Stones, A., Reiss, M., & Mujtaba, T. (2021). 'Science is purely about the truth so I don't think you could compare it to no truth': Students' perceptions of religion and science and the relationship between them: Religious Education and the need for epistemic literacy. *British Journal of Religious Education*, 43(2), 174–189.
- Pluim, G., Nazir, J., & Wallace, J. (2020). Curriculum Integration and the Semicentennial of Basil Bernstein's Classification and Framing of Educational knowledge. *Canadian Journal of Science, Mathematics and Technology Education*, 20, 715–735. <https://doi.org/10.1007/s42330-021-00135-9>
- Polkinghorne, J., Hedley, J., & Chartres, C. (2014). *The Boyle lectures: Science and religion in dialogue*. Gresham College.
- Pongsophon, P. (2010). Using process drama to enhance pre-service teachers' understanding of science and religion. *Cultural Studies of Science Education*, 5(1), 141–156.
- Ressler, L. E., & Hodge, D. R. (2003). Silenced voices: Social work and the oppression of conservative narratives. *Social Thought*, 22(1), 125–142.
- Shane, J., Binns, I., Meadows, L., Hermann, R., & Benus, M. (2016). Beyond evolution: Addressing broad interactions between science and religion in science teacher education. *Journal of Science Teacher Education*, 27, 165–181.
- Shanmugavel, G., Ariffin, K., Vadivelu, M., Mahayudin, Z., & Sundaram, M. (2020). Questioning techniques and teachers' role in the classroom. *Shanlax International Journal of Education*, 8(4), 45–49.
- Singh, P. (2002). Pedagogising knowledge: Bernstein's theory of the pedagogic device. *British Journal of Sociology of Education*, 23(4), 571–582. <https://doi.org/10.1080/0142569022000038422>
- Smith, H., & Higgins, S. (2006). Opening classroom interaction: The importance of feedback. *Cambridge Journal of Education*, 36(4), 485–502. <https://doi.org/10.1080/03057640601048357>
- Spencer, N. and Waite, H. (2022). 'Science and Religion': Moving away from the shallow end. Theos. <https://www.theosthinktank.co.uk/research/2022/04/21/science-and-religion-moving-away-from-the-shallow-end>
- Stanley, T. (2023). New Atheism allowed Trans Cult to begin. The Telegraph <https://www.telegraph.co.uk/news/2023/08/06/christianity-can-end-the-trans-cult/>
- Stones, A., & Fraser-Pearce, J. (2022). Is there a place for *Bildung* in preparing Religious Education teachers to support and promote epistemic justice in their classrooms? *Journal of Religious Education*, 70, 367–382. <https://doi.org/10.1007/s40839-022-00187-5>
- Stones, A., Pearce, J., Reiss, M., & Mujtaba, T. (2020). Students' perceptions of religion and science, and how they relate: The effects of a classroom intervention. *Religious Education*, 115(3), 349–363.
- Streeck, J. (Ed.). (2014). *Embodied interaction (learning in doing: social, cognitive and computational perspectives language and body in the material world)*. Cambridge University Press.
- Tofade, T., Elsner, J., & Haines, S. (2013). Best practice strategies for effective use of questions as a teaching tool. *American Journal of Pharmaceutical Education*, 77(7), 1–9.
- Twiner, A., Littleton, K., Whitelock, D., & Coffin, C. (2021). Combining sociocultural discourse analysis and multimodal analysis to explore teachers' and pupils' meaning making. *Learning, Culture and Social Interaction*, 30, 1–13.
- Varbanova, S. (2018). Hidden curriculum or the power of the side effects in school education. *Knowledge*, 26(2), 447–450.
- Walford, G. (2002). Classification and Framing of the Curriculum in Evangelical Christian and Muslim Schools in England and The Netherlands. *Educational Studies*, 28(4), 403–419. <https://doi.org/10.1080/0305569022000042417>
- Wells, G. (1999). *Dialogic inquiry towards a sociocultural practice and theory of education*. Cambridge University Press.
- Willen, W., & Clegg, A. (2012). Effective questions and questioning: A research review. *Theory and Research in Social Education*, 14(2), 153–161.
- Woolley, M., Bowie, R. A., Hulbert, S., Thomas, C., Riordan, J.-P., & Revell, L. (2023). Science and RE teacher's perspectives on the purpose of RE on the secondary school curriculum in England. *The Curriculum Journal*, 34(3), 487–504. <https://doi.org/10.1002/curj.191>

Young, M. (2014). The Curriculum and the entitlement to knowledge. <https://www.cambridgeassessment.org.uk/Images/166279-the-curriculum-and-the-entitlement-to-knowledge-prof-michael-young.pdf>

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.