

HOW CAN I FOSTER COLLABORATION BETWEEN THE RE AND SCIENCE DEPARTMENTS IN MY SCHOOL?



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The National Institute for Christian Education Research

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This project is being funded by Templeton World Charity Foundation as part of a wider scheme of research titled Big Questions in Classrooms.

Although studies have explored school pupils' attitudes concerning science and religion, there has been little research on beginning teachers' experiences in their development and formation and not much is known about how big questions are framed in classrooms or the extent of teachers' experiences of the science/religion encounter. This project addresses the gap, develops informed responses for teacher education and finds some preliminary understandings of the impact of the use of that knowledge in teacher education programmes.

Find out more at: **www.nicer.org.uk/science-religion-encounters**



TEMPLETON WORLD
CHARITY FOUNDATION



BIG QUESTIONS
in CLASSROOMS

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Science Religion Encounters Toolkit 6

INTRODUCTION

Participants in our online survey were asked to describe the relationship between science and RE departments/subjects in their schools by choosing one of five options:

- Collaboration
- Conflict
- Dialogue
- Independence
- Integration

Research shows that religion and science can often have a complementary relationship.

How, then, might secondary teachers work to build more opportunities for dialogue and collaboration between two related subjects?

TASK 1



Insights from our research

- Participants in our online survey were asked to describe the relationship between science and RE departments/subjects in their schools.
- They could choose one of five options: Collaboration, Conflict, Dialogue, Independence or Integration.
- For all three types of teacher, 'independence' was the most popular way of describing the relationship.
- Primary teachers chose 'collaboration' more often than secondary teachers.
- Secondary RE teachers used 'dialogue' more than other teachers.
- 'Conflict' was a rare choice for all teacher types, but was more common among primary teachers.
- Over 3 in 5 beginning RE teachers (61.8%) and two thirds beginning science teachers (67.7%) saw the relationship between the subjects as 'independence'.
- In this context, 'independence' is not necessarily a positive term.

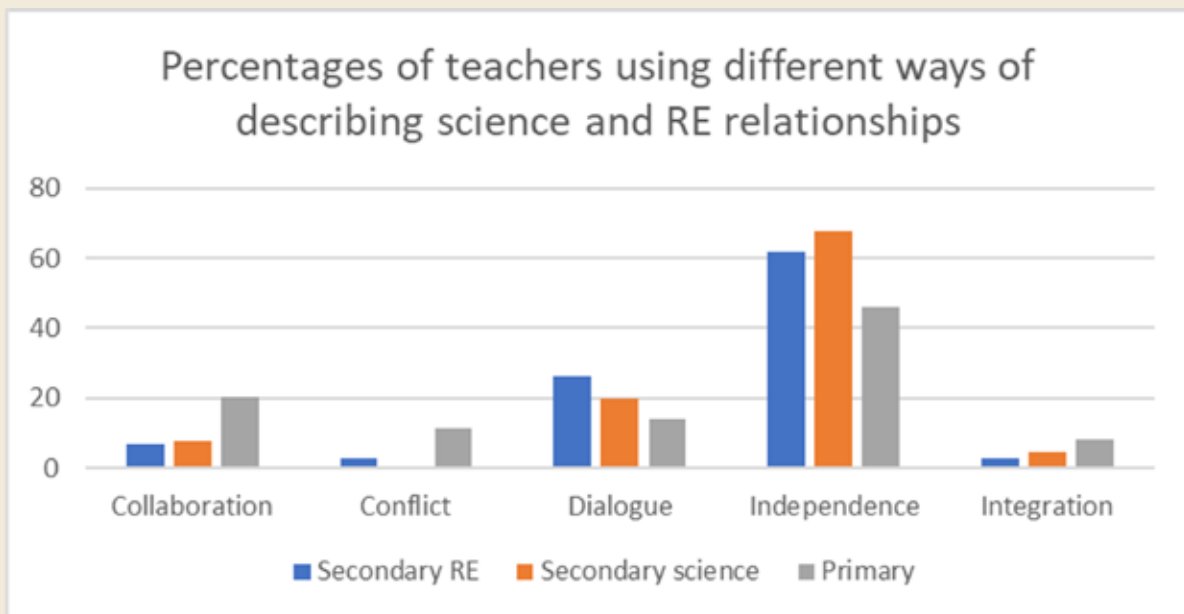


Figure 1: Percentages of teachers using different ways of describing science and RE relationships

TASK 2



Guided conversation with SLT member

- Is there a school-wide approach to knowledge and the curriculum?
- Where do pupils learn about how knowledge is constructed in this school?
- Are there opportunities for pupils to learn about different ways of answering Big Questions, that might cross traditional subject boundaries?
- Are there examples of interdisciplinary learning across subjects in this school?
- Are there opportunities on INSET days or in department planning time, for example, for teachers to talk across departments to find out about recent innovations in subject teaching?
- Are there opportunities for drop-down days for teachers to bring pupils together across subject boundaries?
- Are science teachers ever given the opportunity, time or encouragement to observe RE lessons? And vice versa?

TASK 3



Guided conversation with science teacher

- Share this list of topics that teachers in our research gave as examples of science/religion encounters in the classroom.

	Secondary RE	Secondary Science
Abortion	72.09%	32.89%
Animal antibodies	8.14%	36.84%
Big Bang	77.91%	48.68%
Climate Change	59.30%	69.74%
Creation stories	84.88%	14.47%
Death	81.40%	30.26%
Design argument for the existence of God	82.56%	13.16%
Blood transfusions	24.42%	27.63%
Designer Babies	32.56%	50.00%
Euthanasia	73.26%	18.42%
Care for the environment	66.28%	63.16%
Philosophy of science	24.42%	36.84%
Stem cell research	32.56%	68.42%
Evolution	72.09%	68.42%
Experiences of Covid-19	25.58%	55.26%
Mass vaccination	5.81%	53.95%
Gender identity	48.84%	27.63%

Percentage of different types of beginning teachers who had planned to teach this as a science/religion encounter.

- Which of these do you both teach? Are there other examples where religion/ethics enters into your science lessons or science enters into your RE classroom?
- Do you plan for possible science religion encounters, or give space for them to emerge through pupil questions? Who might you go to in the other department if pupils asked a science/religion question that you could not answer?
- Which of these topics would you like to teach in the future? What barriers would you need to overcome for that to happen?
- How might pupils benefit from you knowing how and when the topic is being approached in the other department (science or RE)?
- When teaching these topics, do you explicitly teach how knowledge works or the disciplinary ways of knowing in this area?
- Would it be possible to plan a lesson or sequence on one of these topics (or another of your choosing) where the relationship between science and religion is explicitly discussed?
- Could this conversation form part of an ongoing conversation between the two departments to explore opportunities for dialogue and collaboration?

TASK 4



Guide for observation of a science lesson

Find a science lesson on a topic (see below) that is also covered in RE.

- What content is being covered in the lesson? How does that compare to the content covered on this topic in RE?
- How is the disciplinary knowledge articulated in the lesson? In the objectives? In the questioning sequences?
- How are words like evidence, proof or other language linked to argumentation used in the lesson? How would this compare with RE?
- Is there reference to scientific method in the lesson? Could RE learn something from this?
- What conclusions do pupils come to as a result of this lesson?
- In what way is the pedagogy different or similar to RE?

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TASK 5



Opportunities for collaboration

One school in Bradford planned a collaborative sequence of lessons in science and RE (called Philosophy, Ethics and Religion in the school), which dealt explicitly with the biology and ethics surrounding Covid-19.

A blog from a science teacher and a RE teacher details some of the decisions involved below:

TEACHING THE BIOLOGY AND ETHICS OF COVID-19 PREVENTION AND TREATMENT AS A CROSS-CURRICULAR COLLABORATION.

Helen Connor and Fran Bailey, Immanuel College, July 2022.

In the September of 2021 colleagues across Bradford Diocesan Academies Trust were invited by Fran Bailey to take part in a research partnership. The partnership would meet half termly to discuss their research, present a topic of interest and to discuss a piece of research as a group. Helen Connor brought to the table a summary of findings of a paper from well-regarded science teaching writer, Michael J. Reiss entitled "Science Education in the Light of COVID-19: The Contribution of History, Philosophy and Sociology of Science".¹

The paper discussed how coronavirus (COVID-19) could be used to teach history, philosophy and sociology within a science lesson. Towards the end of the paper Reiss stated that it was better for the science teacher to teach the ethics of science rather than an ethics teacher.² But Helen was hesitant about this. Helen felt that she taught this aspect of science poorly, usually with a statement of the pros and cons of the topic being evaluated which Reiss identifies as poor practice in his paper.² He discusses how a good ethics argument is formulated and assessed within philosophy, ethics and religion lessons and so Helen suggested we should tap into our PER (Philosophy, Ethics, Religion) department to show us how it is done. And so the collaboration began.

During the many discussions around the research, we identified that teaching about COVID-19 could present some issues in terms of sensitivity around COVID-19 deaths within our student community and false information circulating on social media which some of our students repeat and believe. We felt that as part of the collaboration it was important to sort fact from fiction in terms of the biology of COVID-19, its treatment and prevention. The discussion of the associated ethics would then empower our students to make informed decisions about their choices with regard with COVID-19 prevention and vaccination. After a series of meetings with Heads of Faculty and the Acting Headteacher, it was agreed that during a week in July, Year 9 would be taught a series of lessons about the biology of COVID-19 and the ethics of treatment and prevention. The Acting Headteacher asked to see all planned work before delivery as there were concerns about parental responses to these lessons. There had been limited take up of both lateral flow testing and vaccination within the school during the pandemic, so it was felt that the Acting Headteacher needed to be well informed of plans in case of parental concerns.

This COVID-19 educational collaboration was originally planned as a drop-down morning, with students moving off timetable to work through a double lesson of science about COVID-19 followed by a double lesson about the ethical issues raised by COVID-19. However, when it came to resourcing these lessons, it proved to be too difficult to teach all of Year 9 (a minimum of 12 groups) the ethics lessons at the same time. This was due to there being 13 science teachers in the school and only 6 PER teachers. We decided to complete these lessons at the times of the first two science lessons in a given week and over both times of the PER lessons that same week. Although this would not have the same impact on students as delivering these lessons in a discrete package, it was felt to be preferable than using staff not used to facilitating conversations about ethics with students.

We undertook planning in discussion together. The ethics lessons were also discussed as a department prior to teaching, so that all staff felt comfortable with resources and confident to discuss the issues and ideas raised. Feedback suggests that it might have been beneficial for teachers to also be more explicitly aware of what the other department were teaching in order to better facilitate the cross-department collaboration, although it was difficult in a busy school to enable this to happen. However, conversations with colleagues about these lessons were positive in both departments. All appreciated lessons being fully resourced and were pleased to be working in a collaborative way with another department. Lessons deviated in part away from the plans shared with researchers as teachers followed the discussions from students or spent more time tackling misconceptions. There were also challenges to teaching staff in some of the information, for example around the research provided by Oxfam² in its evaluation of the inequalities of the COVID-19 pandemic.

Lessons were well-received by students, with discussions in both science and PER lessons being rich and thoughtful. Staff noticed, in both PER and science lessons, how many misconceptions needed to be challenged and also how students were asking questions of their own responses to vaccines and testing. Students were able to use their learning in lessons to begin to discuss how they and their family reacted to the pandemic. One student spoke of how he and his family had driven to another city (50 miles away) in search of particular groceries and how he was really embarrassed to recount this.

Another student spoke of not being bothered to get a vaccine when they were offered at school and almost asked for acceptance or forgiveness from his peers about this decision. Most students were able to articulate the impact of COVID-19 on their own family to a lesser or greater extent.

It has been a really positive experience for both departments, and we will be seeking out other opportunities to work across departments again.

¹ Reiss, Michael J. (2020). "Science Education in the Light of COVID-19: The Contribution of History, Philosophy and Sociology of Science." *Science & Education* 29 (4): 1079–1092. <https://doi.org/10.1007/s11191-020-00143-5>

² Berkhout, Esmé, Nick Galasso, Max Lawson, Pablo Andrés Rivero Morales, Anjela Taneja, and Diego Alejo Vázquez Pimentel (2021). *The Inequality Virus*. Oxfam Briefing Paper available at: <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/621149/bp-the-inequality-virus-250121-en.pdf>

TASK 6



Framework to support a whole school approach

Support from senior management is often essential when collaborating across subjects. What support would you like? Why should senior management support interdisciplinary work? Use the findings of this module to write an email to your senior leadership team requesting time and support to plan collaboratively with the science department. Remember to include how the collaboration would support pupils and their learning in both subjects. See the following suggested points.

1. To avoid lost learning and advance curriculum coherence, schools can develop a cross-curricular matrix around priority topics that more than one subject addresses.
2. There is evidence this could be a real benefit for topics that would benefit from good curriculum sequence in RE and Science.
3. School curriculum leads could identify selected examples of topics which RE and Science address currently which offer opportunities for viable sequence change.
4. School curriculum leads could prioritise those topics in relation to school values to focus on those thought to matter most for avoiding unnecessary lost learning. It is not practical to cover all topics so focus on the topics that matter most to the school.
5. [If not already in place] More broadly school curriculum leads could expand this to create a whole school curriculum matrix. Such a matrix could communicate these specific topics and the collaborating departments to staff to raise the profile of the need to avoid lost learning and the need to advance curriculum coherence.

RESEARCH SUMMARY

Examples of collaboration between RE and science departments

Focus groups were carried out with 75 student teachers. Some were able to describe collaborations between science and RE departments that existed in their placement schools and the effect that had on them as beginning RE teachers. The extracts below provide some of these examples.

I know my school, when they're teaching about creation, they plan and work with the Science department so that it's being covered at the same time. So the students are able to get a more in depth understanding of it than maybe what we'd be able to deliver for them as RE specialists. So they get the more scientific point of view and then we get to teach them the RE side... I think I definitely have been asked some quite tricky science questions and I'm just like "I have no idea". But I think for me, I'm just quite honest with my students and I'm like "Look, I can help you only so much when it comes to the science part but take these questions to your next Science lesson and build on it and then come and tell me about it". And I try and get away with it that way.
[Student RE teacher]

We did creation. And we aimed it at Year 8 and it was actually a lot more helpful because obviously when discussing the planning, by this point I had already taught a creation lesson to Year 10. But it was really helpful because it kind of clarified those misconceptions that I had and made me feel a bit more secure in my knowledge of the Big Bang for example because I didn't know a lot about it. Only what I had read on the slides, from what I had taught, like a little bit of extra research I had done. But there's quite a few scientific words out there when you research it. And I don't know what they mean. And so it was actually really helpful working with this [science] teacher. However, she would never have taught that lesson in the same I don't think, to science as I would for RE. I think it's a lot easier to apply the science to RE lessons but not RE to science lessons.
[student RE teacher]

I teach 'A' Level as well, so I've had the opportunity to teach the teleological and cosmological arguments. So Science does creep in there. GCSE, when we're looking at creation, we will look at natural selection and the Big Bang theory and compare them. But also at my school I didn't teach this, but I saw it being taught, when they look at Catholic scientists to show how actually some of the great scientific thoughts developed from extremely religious people. And these people are showing you that they don't have to be opposed and that actually it can make sense as one. [student RE teacher]

Knowledge of religious scientists

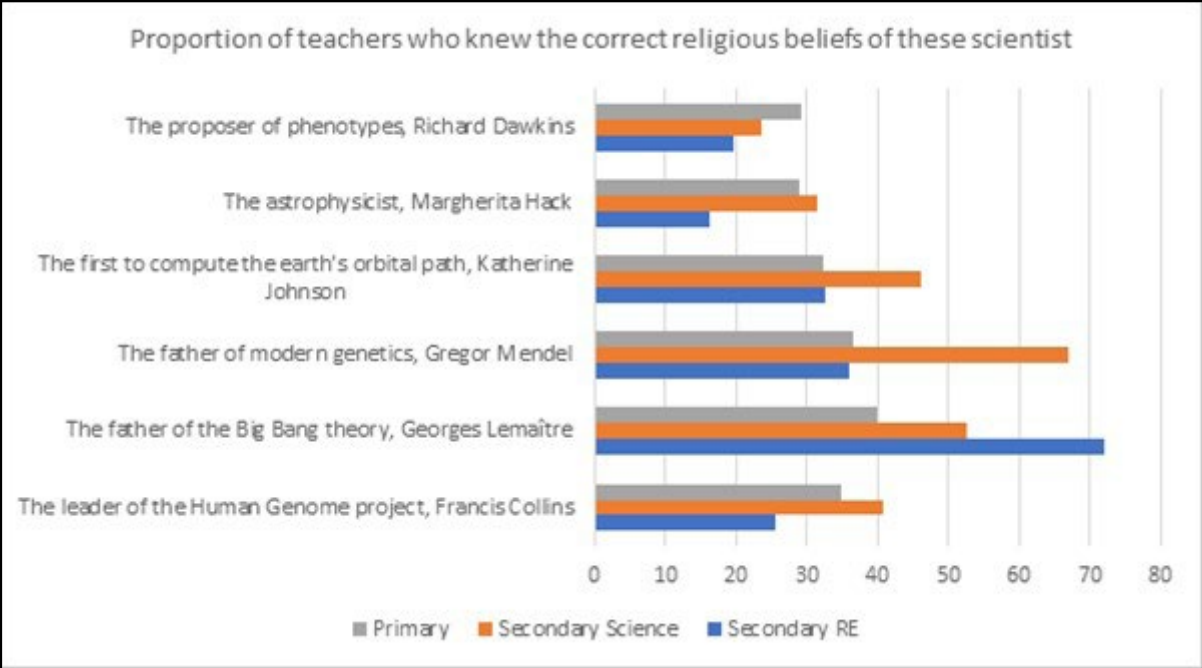
One finding from our research project was that science teachers are more likely than RE teachers to know when scientists are religious. A collaborative project on religious scientists, or simple dialogue between teachers to encourage being explicit about religious scientists in both subjects, could help to break down false dichotomies between religion and science in the minds of pupils.

RE misconceptions were also measured by asking participants to indicate which of six prominent scientists were, in fact, and counter-stereotypically, religious. The first four listed in Table 32 are/were famously religious while the last two are/were not. The results showed that science teachers have more accurate knowledge of the religious beliefs of these scientists, apart from Georges Lemaître, about whom secondary RE teachers were more accurate. This results shows less misconception in secondary science teachers than in RE teachers. It could be argued that the beginning science teachers simply know their scientists better than the beginning RE teachers.

Table 32: Percentage of teachers of RE and science who knew the correct religious beliefs of these scientists

Which of these are/were religious?	Secondary RE	Secondary Science
The leader of the Human Genome project, Francis Collins	25.6	40.8
The father of the Big Bang theory, Georges Lemaître	72.1	52.6
The father of modern genetics, Gregor Mendel	36	67.1
The first to compute the earth's orbital path, Katherine Johnson	32.6	46.1
The astrophysicist, Margherita Hack	16.3	31.6
The proposer of phenotypes, Richard Dawkins	19.8	23.7

Figure 23: Percentage of teachers who knew the correct religious beliefs of these scientists



TASK 7



Further reading

Barbour, I. G. (1990) *Religion in an Age of Science: The Gifford Lectures 1989-1991, Volume 1*, San Francisco, CA: Harper and Row.

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