Case Study

Science and Religion: Terraforming

Key Stage 3 Classes: Paul Hopkins

Purpose

This case study considers the ideas around creation and stewardship and thinks about the nature of origins and the responsibility we have to the world in which we live. The purpose was to create a meaningful connection between the programmes of study for RE and science that would enable two departments to cooperate in the production of a compelling learning experience that would broaden and deepen students' understanding in both subjects.

Main emphasis

Year 7 students were considering their place in the world and the way in which they should treat the world. They had been looking at a number of stories of creation and comparing the main elements in the stories looking for narrative threads and commonalities. The conceptual focus was *'Interpreting teachings, sources, authorities and ways of life in order to understand religions and beliefs'* and *'exploring some of the ultimate questions that confront humanity, and responding imaginatively to them.'*

We wanted to then think about how advances in scientific technology might give us 'godlike' powers. So, we considered the idea of creating a new planet and the theological and ethical questions we would face if we could do so.

The plan would be to involve the science department in talking both about the science and the ethical questions – revolving around 'should we do something just because we can?'

School profile

This unit of work could be undertaken with any age group in Key Stage 3 but the example described was undertaken with a group of Year 7 students.

This unit was trialled in a very mixed school but with a bias towards the academically less able. The school had students across the age range achieving GCSE A*-C grades below national average but had a contextual value-added score (CVS) of 1030 so was doing very well with the students that they had.

Question 1: What are we trying to achieve?

Identifying the priorities for development

What were our learners like at the start?

The students had looked at creation stories in their primary schools and whilst they had all covered the Genesis story (some from both versions within Genesis 1 and 2 and some from just one) they had little other commonality of experience of creation topics but had a general idea of the narrative process. We wanted to look beyond the narrative to consider how the concept of stewardship would work if you had a chance to start from scratch and also to think about the relationship between the created and the creator.

The class was a mixed ability group covering the whole ability range with a small number of the students having statements but looking at the KS2 results there was a bias towards the lower academic group as there was a selective school in the vicinity.
Some of the students had some experience of independent learning as some of them had come from a primary school which had been using a SEAL (Social and Emotional Aspects of Learning) programme and also using some P4C (Philosophy for children) techniques; so these students were used to working in groups and in undertaking dialogic work. This was not universal.

The language and literacy of the students was proportionate to the academic spread. Some were capable decoders and were able to extract meaning from text, some were able to decode but found comprehension more difficult and some were poor readers.

What differences did we want to see in our learners?

In terms of *knowledge understanding and skills* we wanted the learners to consider the relationship between the world in which they lived and their responsibilities for this world (constructivist learning). We wanted them to develop their group working skills (collaborative learning) and to build on the knowledge of the creation narratives that they already had (development of knowledge) and we wanted them to develop a more empathic approach to learning. Most of the students had had a 'AT1' approach to RE in their primary schools and we were keen that they should develop a more AT2 response in this activity.

We were also keen that students should realise that the technological and scientific developments that are happening are not value or ethic free and that scientists and technologists should be asking ethical and spiritual questions of and about the work they are undertaking. This would also support the school's development of the SMSC (Spiritual, Moral, Social and Cultural) aspects of the curriculum.

Question 2: How will we organise learning to achieve our aims?

How did we set about making a change?

We first designed some key questions to engage the students' interest:

'Is Mars ours for the taking?'
'What responsibilities do humans have for the known universe?'
'What are living things? And what rights do they have?'
'If you were able to terraform Mars what are the ethical and spiritual issues that are raised?'

We focused on two key concepts. First we looked at the AT1 concept in the locally agreed syllabus, 'Interpreting teachings, sources, authorities and ways of life in order to understand religions and beliefs'. We wanted the learners to consider how the teachings that they had encountered previously regarded the relationship between humanity and other aspects of creation. This raised questions about which aspects of creation are part of the 'moral community', whereby things are considered to have moral worth and so should be taken into account if we are setting a moral framework. If something is not part of the moral community then that means it is simply not considered in the process of ethical decision-making.

We wanted to extend this to discuss the controversial idea of 'playing God' and how we could create a set of guidelines or ethical standards for the way we should behave. This then naturally picked up the AT2 key concept in the locally agreed syllabus, 'Understanding how

moral values and a sense of obligation can come from beliefs and experience'. The nature of the tasks also meant that we covered the second part of this key concept, 'Evaluating their own and others' values in order to make informed, rational and imaginative choices.'

Most entities in our known universe, but outside our own small planet, are considered to be outside the moral community, and therefore are accorded no consideration or rights.

When considering the terraforming of Mars we have to ask what moral accord do we give to another planet. Mars exists in its own right. In a non-human way it is perfect, following the natural laws of the universe. What does our desire to terraform it say about the way we humans see ourselves in relation to the universe? The word 'arrogance' has been used. Part of the programme was to introduce students to the philosophical idea of a values system based on 'cosmocentric ethics' – a system which regards all entities as being worthy of moral consideration, though not necessarily of equal moral significance.

We also wanted this to link to some science in deepening their understanding of the process and nature of terraforming. This covered several aspects of the breadth of study in the key stage 3 science programme of study, including: 1b, considering ways in which science is applied in technological developments; 1c, considering the benefits and drawbacks of scientific and technological developments, including those related to the environment, health and quality of life; and 2a, using scientific language … and to provide scientific explanations based on evidence.

The topic itself, with the idea of being able to explore and terraform a planet, engaged the students and motivated them to learn more. We also used stimulus material that was unusual in the RE department. This included video extracts from such films as *'The Red Planet'*, *'Total Recall'*, *'Mission to Mars'*, *'The Search for Spock'* and *'The Hitchhikers Guide to the Universe',* and asking students to respond using prose, video and poetry.

Students were working from levels 3 to 6 in RE and at levels 4 and 5 in science. Work was peer assessed using the 'levels in child-speak' that have been developed and whilst students were offered assistance from the teaching in grading and there was some sampling of grades the work was not re-marked by the teacher.

The learners had 4 x 60 minute RE lessons with input from the science department on the following topics:

Lesson 1: The Planet Mars

- What do we know about Mars?
- The uniqueness of Mars

Lesson 2: What on Earth is terraforming?

What is terraforming?

- Arguments for and against terraforming

Lesson 3: The Perfect Planet

- Planetary engineering

Lesson 4: Genesis

- Pattern, symmetry and argument from design
- Stewardship in the Genesis tradition
- How do our choices and interpretations affect our way of life and the planet we live on?

3: How well have we achieved our aims?

What differences are evident? What impact have we made on our learners?

Students were very responsive to the task. They liked the stimulus materials from the images, video, the teachers and the literary forms, and they were keen to engage with the science as well as the ethical and moral issues. There was fascinating dialogue about the 'rights of rocks' as well as the arrogant nature of humanity in its actions in the world today and what rights it would have in the conquest of space.

The students worked well in the groups and, with some input from the teacher, were able to use the tools for discussion which were set up on the P4C model. The groups were arranged so that there was a student in each group who had some experience of constructive group discussion using these methods.

The students seem to have an intuitive idea of embedded ethic and were keen to develop the ethical guidelines for terraforming. Their responses in poetic and picture form showed good spiritual understanding in that they demonstrated insights based on the religious and philosophical teachings they had studied and they considered big questions of 'rights' and 'responsibilities' that went beyond their own concerns.