A Private Universe online resources

By Dr Matthew H Schneps and Dr Philip M Sadler
Reviewed by Erik Stengler, Spain

Human Evolution: A Very Short Introduction

Publisher: Oxford University Press
Publication year: 2005
ISBN: 9780192803603

The History of Life: A Very Short Introduction

Publisher: Oxford University Press
Publication year: 2008
ISBN: 9780199226320

Resources

For a review of two other *Very Short Introductions*, see:

Demoncheaux E (2007) Review of *Fossils: A Very Short Introduction* and *Dinosaurs: A Very Short Introduction*. *Science in School* **6**: 85. www.scienceinschool.org/2007/issue6/fossils

To browse all the other reviews of resources published in *Science in School*, see: www.scienceinschool.org/reviews

A Private Universe depicts a very familiar situation for teachers worldwide, namely that students do not let go of their misconceptions as easily as might be expected after a detailed and thorough learning process.

This series started with an award-winning short documentary feature in 1987. Even 23 years after its production, a collaboration between the Harvard-Smithsonian Center for Astrophysics[w1] and Annenberg Media[w2] (then Annenberg / CPB), it has not lost its relevance. This first part focuses on the astronomical topic of the seasons, particularly on the fact that despite years of education in physical sciences and astronomy, even Harvard graduates still think that it is hotter in summer because the Sun is nearer to the Earth than in winter. The film also mentions another aspect in which misconceptions prevail over formal teaching: the phases of the moon, which are often wrongly explained in terms of obscuration by clouds, rather than by the relative positions of the Sun, Moon and Earth.

This situation is indeed quite widespread, and it is not uncommon to hear complaints by teachers and professors about it. It becomes even more alarming when it is the teachers themselves who pass on these misconceptions to their students. This is often the case in countries where primary-school teachers are not taught any content related to the topics they will be teaching at school. Instead, the focus lies on educational issues, assuming the candidates still know the topics they will teach well enough from their own days at school. The reality is quite different, as is clearly seen in the first minutes of *A Private Universe*.

But *A Private Universe* does not stop at detecting the problem. In order to diagnose its scope and possible causes, the documentary closely follows the learning process of a particular high-school student, considered to be one of the brightest of her class. Her teacher makes quite an effort to explain how Earth orbits around the Sun, and how the seasons are produced by a combination of this and the 23.5° tilt of Earth's axis of rotation. Viewers will be as surprised as the teacher herself when the student, after having shown clear signs of understanding, still tries to save and include her previous misconceptions into her new and even elaborate view on the matter.

Particular misconceptions can be traced back to confusing or ambiguous graphics in a school book, but to lay the blame solely on these accessory aspects would be to completely miss the point, and is definitely not

sufficient to explain the widespread endurance of these misconceptions throughout the educational system.

A Private Universe does not come up with a magical solution. It is however a valuable resource to help teachers become aware of the power of the misconceptions that students bring with them into the classroom. The documentary can be watched freely online[w3] and is the start of a series of videos and resources produced by this collaboration, which can all be accessed freely online. DVDs and VHS cassettes of the videos are also available for purchase, but only within the USA.

The follow-up series, entitled *Minds Of Our Own*[w4], explores further misconceptions and strategies to avoid them. In the *A Private Universe* teacher's lab[w5], a web resource built around the misconceptions on astronomy facts that are highlighted in the first documentary, you can test your own knowledge and misconceptions, comparing them with the most popular answers given so far, or print out a survey for your students. It contains a discussion forum on how misconceptions arise, and a small collection of teaching activities to avoid the most misconceptions about the Sun, Moon and Earth.

The *A Private Universe project in science*[w6] is a collection of nine workshop videos, of 90 minutes each, focusing on one theme and content area of science – from biology, chemistry or physics – and using specific examples to show how students' preconceived ideas can create critical barriers to learning. Education experts also review classroom strategies and results and recommend new ways to involve students and approach difficult topics. Short summaries are available online as support materials[w7].

A similar workshop series (*A Private Universe project in mathematics*)[w8] with an accompanying online teacher's lab[w9] is available for mathematics.

These resources are an invaluable tool not only for primary- and secondary-school teachers of science or mathematics, but also for anyone involved in teacher preparation.

Web references

w1 – Find out more about the Harvard-Smithsonian Center for Astrophysics here: www.cfa.harvard.edu

w2 – Learn more about Annenberg Media and browse the resources and workshops they offer to teachers here: www.learner.org

w3 – To watch *A Private Universe* online, see: www.learner.org/resources/series28.html

w4 – To watch *Minds of Our Own* online, see: www.learner.org/resources/series26.html

w5 – Access the *A Private Universe* online teacher's lab here: www.learner.org/teacherslab/pup

w6 – To watch the *A Private Universe project in science* workshop videos, see: www.learner.org/resources/series29.html

w7 – The support materials to the *A Private Universe project in science* can be found here: www.learner.org/catalog/extras/puptwsup.html

w8 – To watch the *A Private Universe project in mathematics* videos, see: www.learner.org/resources/series120.html

w9 – The *Patterns in Mathematics* teacher's lab can be found here: www.learner.org/teacherslab/math/patterns

Resources

To browse all the other reviews of resources published in *Science in School*, see: www.scienceinschool.org/reviews