

Chapter 70

Mobile Content and Walking Documentary: Teaching and Learning Science Step- by-Step With Smartphones

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ABSTRACT

This chapter presents creative strategies to teach Science using Smartphones and focuses on projects by researchers and teachers from the international “Big History” network. They teach scientific based knowledge from a cosmic point of view starting from the theory of the Big Bang. A large number of contributors believe that connecting learning to the physical, natural world is the key to stimulating the interest of students before studying the theory in the classroom. This is where Mobile Content is invaluable. A general selection of interesting outdoor learning projects are presented, together with experimental, hypermedia creations achieved by the author in collaboration with scientists. The original concept of a “Walking Documentary” is advanced as a way for students to experience large scales of space and time by walking with a smartphone synchronized with every step of the walker. Finally, some emerging technologies are mentioned, announcing new ways to teach and learn Science with technology.

INTRODUCTION

The First Step on the Moon: A New Scientific Perspective for Humankind

On July 20, 1969, the first human step made on the lunar surface was transmitted to a worldwide audience. This incredible technical achievement was to have very deep consequences in the imagination of humankind for decades. For the first time we saw the Earth from the outside and the images broadcast on TV will be forever engraved in the minds of millions of people.

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The most important fact was not brought back in 25 kilos of lunar rock but was planted, like a seed, in the collective imagination. This profound experience was acting, as Richard Dawkins (2012) describes in his book *The Selfish Gene* as a “Meme,” a process of viral information transmitted from mind to mind like a shockwave. This stunning technological success by the space industry was followed by another major revelation explained in 1990 by the scientist Carl Sagan. Deeply inspired by a picture of the Earth taken by the space probe *Voyager 1*, he describes the Earth taken from a distance of 6 billion kilometers as a tiny “pale blue dot” lost in the dark. This insignificant 0.12 pixel sized dot is our home. This radical point of view of Earth, compared to the size of the solar system will also mark a new perspective in the way we think and experience our position in the Cosmos (Sagan, 1994). These two facts from 1969 and 1990 will have deep consequences in a generation of scientists born in the 20th century. One of the major repercussions of this phenomenon is the theory advanced by James Lovelock in 1970, with the help of Lynn Margulis, of a living Earth. In which they describe the Earth as a single living organism composed of millions of interconnected species of plants, fungi and animals in equilibrium and where humans are just another form of life. The consequences of this new perspective are still expanding, the shockwave is becoming a large and long wave of energy, a necessary tsunami of consciousness, if we want to preserve the pale blue dot.

Today several key fields of knowledge are influenced by the exploration of the Cosmos. Probably the most important knowledge is that we live on a finite Earth with a limited number of resources, and it is absolutely necessary to preserve them. This redefines how we understand ourselves and the place of humanity in the story of space and time. Several scientists like Fred Spier, Rich Blundell, Elisabeth Sahtouris and Lynn Margulis, among others, understood that teaching Science today is about explaining things in a expanded space-time context and in an inter-disciplinary way. Lynn Margulis (1998) was able to call into question the most established concepts of evolution, arguing that multicellular organisms are the results of symbiogenesis, that is a form of collaboration between single cells sharing their DNA (Eukaryotes). This point of view gives more weight to collaboration than competition in the process of natural selection. Collaboration could be the key to humanity’s future, and the survival of the “pale blue dot”.

The new worldview of Earth as a self-regulating complex system has been embedded in our culture since the 19th century. The Russian scientist Vladimir Vernadsky was the first one in 1926 to coin the term “Biosphere” meaning all living things, bacteria, multi-celled organisms, animals, plants, and fish are all part of a single living system. Vernadsky (1926) identified *Homo sapiens* as an intelligent life form, who with our minds, created the “Noosphere” (minds sphere) distinctly separate from the “Biosphere.” This idea of a global human intelligence network will be retaken from another angle a few years later by the Christian theologian Pierre Teilhard de Chardin (1955). His concept of a single nervous system composed of all human beings, creating a common thinking layer has now seen its formation in the World Wide Web. It is the hybridization of the “Noosphere” with the “Technosphere”.

The biologist Elisabeth Sahtouris explained in a very nice metaphor called “The Butterfly Story” what open minded scientists are trying to communicate to the new generation. In Sahtouris’ metaphor humanity is symbolized by a caterpillar eating three hundred times its own weight in a single day, and metamorphosing into a completely new and distinct life form, a butterfly. Sahtouris suggests that it’s time for humanity to convert itself in a distinctly new life form, considering that we already have all the information, knowledge and technology to do so (Sahtouris, 2000). This important message is embedded in the content of some interesting audiovisual and multimedia experiments described below.

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