



GUEST COMMENTARY

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Considering the Place of Ethics Instruction in Science Education

We frequently encounter ethical dilemmas and issues in our daily lives but how much place should there be for a focus on ethics in science education?

At one pole are those who think that the function of science education, perhaps especially school science education, is simply to introduce learners to core scientific knowledge and scientific practices. Therefore, the most that ethics might be expected to do is to help motivate learners. For example, if teaching a secondary school physics lesson about the generation of electricity, one might include, for general interest, a little bit about the ethical implications of such generation from renewable as opposed to nonrenewable resources.

At the other pole are those who think that while a central function of science education is indeed to introduce learners to core scientific knowledge and scientific practices, these are frequently intertwined with ethical questions – as the electricity generation example indicates. Furthermore, one might argue that only a minority of school students are interested in science for its own sake, with most interested in seeing the relevance of what they are studying. These students are more likely to find science interesting if it is discussed in context, with ethical issues included. This argument for the inclusion of ethics in science education seems especially convincing in biology education, since so much of biology intersects with ethical questions. For instance, should we use gene technologies to help prevent diseases?, Do we have a duty to conserve biodiversity?, and so on.

In our new book, *The Place of Ethics in Science Education: Implications for Practice*, we examine whether ethics should be taught in science education and, if it should, why and how. Take, for example, a standard topic like plant growth. Some students find it fascinating, at the elementary level, to learn about how water, light, and warmth are needed for a plant to grow, with secondary students also learning about the need for chlorophyll and carbon dioxide. Other students find it easier to learn about plant growth if it is set in context, such as the work of crop breeders to maximize crop yields.

But this immediately might (perhaps should) raise all sorts of ethical issues. For instance, 38% of the world's land surface is used for food production – though only about one-third of this is used for growing crops with the other two-thirds being used for grazing livestock. One ethical issue is whether we humans have the right to commandeer so much of the Earth's surface for our food? The resultant habitat loss is one of the major factors driving the extinction of wild species. It is estimated that one species goes extinct about every 20 minutes – a rate some 1000 times or more higher than the “background” rate – that is, the rate at which species would naturally go extinct without human involvement.

Students of any age can think, learn, and talk about the tension between growing crops for human ends and preserving natural habitats for the benefit of wildlife. Consider oil palm, the most important vegetable oil crop in the world, with an annual production of around

75 million metric tons. On average, each of us consumes about 8 kg of palm oil a year; just look at many food labels for evidence of this. Oil palm is a perennial plant and palm oil is derived from its fruit. The problem is that palm oil plantations result in major deforestation. It is a tropical crop with the largest producers being Indonesia, Malaysia, Thailand, and Nigeria, so the deforestation occurs in species-rich tropical regions, and therefore leads to substantial biodiversity loss.

Of course, there are arguments against the inclusion of ethics in science education. Those who argue that ethics should not be considered where science is taught make several points. These include the idea that science and ethics belong to very different domains of knowledge, and so are best considered separately; that it's asking too much of teachers of science to cope with ethics too; and that the science curriculum is already full without taking on ethics also. Those who take the contrary position argue that the epistemological distance between science and ethics can be overstated, or is not so crucial, and that other objections seem to presume a cadre of specialist teachers who teach only science. This may be the case in some secondary schools but is rarely the case at the primary level and doesn't really apply as an objection in the informal world of museums and nature centers.

We conclude that there is much of value in including some focus on ethics within the teaching or communication of science. However, if science teachers are to be expected to include ethics in their teaching, they need appropriate support in their initial teacher education and continuing professional development, and through the classroom materials that they use with their students.

Finally, the inclusion of ethics in school science should not only be undertaken in school science classrooms by regular science teachers. Other ways of teaching ethics in science can work well. For example, coteaching between subject specialists can help introduce students to different ways of looking at ethical issues; external visitors with special expertise can be valuable; and there are many benefits to taking students on visits. Of course, all these additional ways of teaching ethics with science take time, but, even if done only very occasionally, they can be valuable. However, there is still much that regular science teachers can do on their own in their own classrooms.

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