Review of: "If knowledge were simpler, we would all be wiser"

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Potential competing interests: No potential competing interests to declare.

The article by Michael Wood proposes that academic knowledge could and should be simplified, without “dumbing it down”. If achieved, this accomplishment would provide huge benefits to society.

I think that everybody would agree with such a statement. The article is stimulating, thought provoking and interesting to read. The author is fully aware of the many complexities and difficulties involved in the possible simplification of knowledge, or even in the definition of simplicity itself. Unfortunately, in my opinion, the manuscript provides little advancement towards the proposed goal.

Before detailing my comments, I need to clarify that I am a scientist, a university professor and a regular peer reviewer for scientific journals. As such, according to the author, I might be “steeped in conventional ways of looking at [my] subject and so may not be receptive to alternatives” and “have an interest in keeping [my] subject sufficiently complicated to protect [my] status as expert”.

In the following, I will limit my considerations mostly to scientific knowledge since this is my area of expertise.

The main limitation of the article is that it provides very few practical examples of how knowledge could be simplified. More importantly, no data are reported on the efficacy of the proposed simplifications in the transmission of knowledge. The author laments “the complete absence of academic journals on the theme of simplification”. I would argue that this statement is incorrect. Many journals are devoted to the teaching of science and to the search for new, and more effective teaching methods (e.g. Journal of Chemical Education, Physics Education). The author even published in some of them (Mathematics in School, Teaching Statistics). I would suggest that Dr. Wood collects data on the practical application and effectiveness of his proposed simplified approaches.

Personally, I am unconvinced by the examples of simplification presented in the article, particularly by those focused on avoiding mathematical formulae, or the exponential function. In science, mathematics is a powerful tool. Trying not to use it is far from simple, since it requires ad hoc solutions in each specific case. You can definitely build a wooden house with just a hammer and a hand saw, but I would argue that learning how to use the currently available power tools would make the process much simpler. Similarly, you can try to explain everything using just arithmetic, but the invention of calculus made science much simpler (at least, from my point of view). Efforts focused on learning the use of these tools are definitely well spent, since they avoid the need for explaining the meaning of limits, derivatives or integrals every time you need them.

Another important drawback of the paper is that the author's concept of simplicity remains unclear. Dr. Wood knows that this term does not have a univocal definition, but in my opinion excessive confusion about this point remains in the article. For instance, the meaning of "simplification" in the development of scientific theories, or in the teaching of science is very different. The main goal of physics has always been the search for unifying theories that could describe and predict, with a limited set of laws, all the complex and diverse phenomena observed in the world surrounding us. Similarly, chemistry has been able to explain very diverse empirical observations on the behavior of substances with unifying laws based on atomic and molecular processes (quantum and statistical mechanics). These theories are mathematically or conceptually more complex than the simple collection of empirical observations, but they do bring order in our view of natural phenomena. Simplification in teaching is a completely different topic. The author discusses this distinction, but still bases some of his arguments on the "simplification" involved in the development of scientific theories. I think that this approach is confusing, and should be avoided, focusing the discussion on the transmission of knowledge.

Regarding scientific education, I would argue that most textbooks are already the result of an impressive process of simplification. Anyone who read the original articles where scientific ideas have been developed could testify that learning these concepts from a textbook is much, much easier. Finding new effective simplifications is hard. This is why I would suggest that the author focuses his efforts in this latter area.

Finally, I agree that any topic can be taught to any audience and at any level. However, many efforts in this direction have already been done. For instance, regarding quantum mechanics (which is particularly appealing to the author), books are available trying to reduce the complexity of the subject to a theoretical minimum (Quantum Mechanics, The Theoretical Minimum, L. Susskind, Basic Books, 2015), using pictures only (Quantum in Pictures: A New Way to Understand the Quantum World, B. Coecke and S. Gogioso, Cambridge Quantum, 2023), for kids (Quantum Physics for Smart Kids: A Little Scientist's Guide to Atoms, Molecules, Matter, and More, C. Pazos, Sky Pony, 2020), or even for babies (Quantum Physics for Babies, C. Ferrie, Sourcebooks Explore, 2017).