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EDITORIAL

Cobra Effect in Science Education?

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There is a story about how the British Colonial Government in India tried to control the overpopulation of cobras by offering financial rewards to those turning in dead cobras to the administration. Although the policy seemed to work initially, over time, the problem worsened when people, motivated by the financial incentive, started to breed cobras. The proposed solution to the problem by the government backfired and actually made the problem worse. Hence, came the terminology of the "cobra effect" which highlights the unintended and negative consequences of a proposed solution.

Ironically, recent policy initiatives in India may have inadvertently exerted the cobra effect on the science curriculum. Last year, educational changes have resulted in topics such as the periodic table, evolution, electromagnetism, and sustainability being dropped from textbooks aimed for 11–16-year-old students (NCERT, 2022). The rationale for such deletions was the making of space in the curriculum through reduced subject content knowledge to provide more opportunities for the development of traditionally underemphasised knowledge and skills. For example, the National Educational Policy advanced a vision that is intended to honor indigenous forms of knowledge in curricula along with other objectives such as the promotion of critical thinking skills.

While the legacy of colonial oppression, exploitation, and injustice need to be addressed in curricula, it is questionable if the way to do so is through depriving students from learning topics that are so fundamental to contemporary science. How is a student to understand the world of chemistry without knowing how elements work? What is the point of biology education if students do not understand that life involves evolutionary processes? Learning of the legacy of colonialism and national heritage (as well as important skills such as critical thinking) need not be mutually exclusive from learning of the contemporary consensus of the scientific community. Students need to learn about social justice. They need to appreciate their cultural heritage. They need to understand science.

The old and tired culture wars need no further fighting. Rather, science education needs constructive solutions situated in positive narratives about possibilities. Simple solutions to complex problems are unlikely to be effective and may even backfire with more problems themselves. Meaningful solutions will demand more than linear dealings of deletions, additions, and substitutions. They will require systemic thinking where innovative and creative problem-solving serves to unify multiple and disparate agendas thoughtfully where students are empowered, not disadvantaged. As an example, in our work on the *Oxford*

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Argumentation Science and Religion (OARS) Project, we have taken the age-old problem of science versus religion and made a possibility out of it by capitalising on what teachers can learn from each other in a professional community of science and religious education. Rather than insisting on an epistemological impasse, we saw a possibility in foregrounding the strengths of each community of practitioners. By focusing on argumentation as both a common but also rather distinct way of reasoning in both school subjects of science and religious education (RE), we discovered the potential of transcending traditionally unproductive conversations. In fact, RE teachers became a resource in the professional development of science teachers given the extensive use of argumentation as a pedagogical strategy in their curricula as compared to the science curriculum (Chan & Erduran, 2023; Erduran et al., 2022).

Despite the best of intentions for improving science education, might there be lines of research where our conclusions fall short of anticipating potentially unfavorable outcomes that our research has not considered? Are some areas of research counterproductive in ensuring that the quality of science education is enhanced? Are we missing out on potentially useful learning experiences particularly for teachers, students and other stakeholders when our research promotes a vision in a single-handed manner? The "cobra effect" analogy might be a useful reminder for us as researchers in having a close check on the nature of our research and its consequences.

Declarations

Conflict of Interest The author declares no conflict of interest.

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