

# TAMING NANOTECHNOLOGY INTO CURRICULUM CONTENT: TEXTBOOK ANALYSIS THROUGH THE LENS OF DARK PEDAGOGY

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## ABSTRACT

*The current study is an attempt to explore how the perspectives of “dark pedagogy” and, more broadly, “New Materialism” could be deployed in the interpretation of socioscientific issues-related curriculums. The concept of “hyperobject” was particularly deployed to understand how well curriculum materials could support the challenge of anthropocentrism brought about by the presumed divide between culture and nature. The nanotechnology-related sections in three senior secondary Physics textbooks commonly used in Hong Kong have been included in the current analysis. Through considering how well the characteristics of “hyperobjects” are being included in the textbooks, it is asserted that the impossibility to grasp the totality of nanotechnology has not been given due attention. The ignorance of the withdrawal of nanotechnology was suggested as contributing to the sustaining of anthropocentrism in the discussion of socioscientific issues. To combat the manipulative mindset resulted, a reframing of the curriculum through a dark pedagogy lens that foregrounds the emergence of agency and the feeling of surprise is being suggested. It is further recommended that the New Materialist perspective be more broadly deployed in the science education research community.*

**Keywords:** *Dark Pedagogy, Hyperobject, Textbooks*

## BACKGROUND

Lysgaard, Bengtsson, and Laugesen (2019)’s “dark pedagogy” presents itself as a New Materialist perspective that calls for a rethinking that promises fundamental transformations in all critical aspects of human society amid the Anthropocene. The reconsideration involves challenging the privileging position of humans, reconnecting to the non-human “things”, and awakening the state of wonder.

Their perspective was suggested as a possible means to handle education content (of, for example, Environmental and Sustainable Education) about which we can be knowledgeable in part, while a total understanding of such content appears to be impossible (Lysgaard and Bengtsson, 2020). With such recommendation in mind, the current small-scale study serves as a “proof of concept” of deploying the New Materialist perspective in analyzing the socioscientific issue (SSI)-themed curriculum materials. The concept of “hyperobject” was particularly deployed in the analysis.

Nanotechnology should be understood as a hyperobject. Morton (2013) suggested five characteristics of hyperobjects: viscosity, nonlocality, temporal undulation, phasing, and interobjectivity. Since nanotechnology entangles with us despite the possible effort to escape, presents itself as human-created things despite irreducible into isolated “things”, stays in the ecosystem for a long time from now despite the short history of technological use, withdraws from our sense despite best observational efforts, and forms networks with humans that result in emergent agency despite the sum of the individual agency, nanotechnology should be considered as a hyperobject that our finite cognition can never grasp in full.

## PROBLEM, METHOD & FINDINGS

Such consideration of nanotechnology implies an assumption that any attempts to tame the inapprehensible nanotechnology into textbook content could never be entirely successful, and any textbook discussions should admit the finitude induced by the impossibility of a total grasp. The current

analysis intends to examine whether such impossibility has been probably indicated. Such indication is essential for avoiding the neglect of the “darkness” of the issue that gives rise to a false sense of security.

To illustrate how dark pedagogy could inspire the analysis of socioscientific issue (SSI)-related content in the curriculum artifacts, the list of characteristics of hyperobjects was deployed to consider nanotechnology-related content in the three selected Physics textbooks (indicated with asterisks in the references section) published after the minor curriculum change in 2014. The chosen section is a marginalized topic under the elective topic of “Atomic World” in the Physics curriculums for senior secondary students in Hong Kong.

The examined textbooks deliver certain messages on the viscosity and nonlocality, with limited implied notes on the phasing and interobjectivity of nanotechnology. Through the statement of the accumulative effects of nanoparticles on human health and their dispersal in the ecosystem, students were told that nanotechnology stays in the biological systems with no easy way of removal, and the presence and effect of nanoparticles are widespread and challenging to be identified in an isolated manner. The insufficiency of current understandings of the effect of nanoparticles, including the possible ones that emerged from unforeseeable interactions, serves as an implicit message on the possible withdrawal of nanotechnology and the emergence of properties due to the nanotechnology-involved assemblages. However, there is virtually no message on the temporal undulation of nanotechnology, despite that their viscosity implies the long-term stay of the nanoparticles at both organismic and ecological levels.

The textbook analysis demonstrates that the attempt at complexity reduction results in the lack of attention to the assemblages formed due to the research on nanotechnology and the use of its product in the textbooks, which leads to the fragmented perspective of the human-technology relationship. Besides, the limited attention on the emergence of agential properties, together with the lack of awareness towards temporal dispersity, has led to a false sense of security resulting from the overconfidence of the human agency. The analysis demonstrates that the insufficiently satisfying coverage of SSI in the curriculum materials is not solely a matter of comprehensiveness but perspective.

## IMPLICATIONS

The deployment of the perspective of dark pedagogy entails the need for curricular changes. The curriculum artifacts should present SSI through a balanced view of the agency and finitude of humans. The emergent outcomes resulted from complex interactions should be given more highlights to combat the manipulative mindsets. The feeling of surprise and fear should be there together with the virtues of prudence and courage, which permit an engaging discussion of the SSI without being “information dump” that leads to Morton (2019)’s “trauma dreams”.

Besides, this paper also demonstrates how the science education research community could deploy the ideas of dark pedagogy outside environmental and sustainability education. It is hoped that the current study could trigger further dialogues on the potentials of New Materialists’ ideas and concepts in the analysis of curriculum artifacts and processes.

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