

# A BUOYANT FORCE: PEDAGOGICAL THRUST TO THRIVE IN LEARNING QUANTUM WITH INNOVATIVE PEDAGOGY, CURRICULUM, AND PEDAGOGICAL TOOLS IN A COLLABORATIVE AND DELIBERATIVE LEARNING ENVIRONMENT

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## THEME:

Innovative STEM pedagogy and curriculum

## BACKGROUND AND AIMS

If we carefully look at the issue of heavy science curriculum (a curriculum full of content learning with various complicated concepts and topics), we accept how it slows the student's progress and makes their learning harder. It seems that heavy curriculum does not let the student advance easily, and the student moves with some difficulty to the higher level. I utilize a concept in science and its scientific logic to convince you that heavy curriculum alone is not productive and effective with regards to the improvement in students' science learning. However, this heavy curriculum can be truly constructive and progressive when it is accompanied with the right innovative pedagogical thrust (upward force—an effective push for constructive progress) with deliberation in a positive collaborative learning environment.

Buoyant force (thrust to thrive, achieve, and progress in learning) is an upward force exerted on an object (ship or curriculum) when placed in a fluid (in a positive collaborative and deliberative learning environment). The way that a cruise ship is designed and altered for better float and balance in water is similar to the way that the “bulk of curriculum” is diverted from theory to practice with innovative approaches in curriculum and pedagogy for experiencing a better, more balanced, and sustainable learning. I take you to the heart of the heavy curriculum, *wave-quantum-curriculum*, with being *eclectic* from a large *bulk of curriculum* and focussing on *practice* with updated technological pedagogical tools in a *deliberative* and *collaborative* inquiry-based learning setting, with help from Joseph Schwab, John Dewey, and Karen Barad.

## METHODOLOGY OR PROCESS(ES) UNDERTAKEN

The issue is followed by a literature review, self-study, and my individual observations, actions, practices, and my lived experiences in the field of science education (curriculum and pedagogy) with my designed, developed curriculum (*wave-quantum-curriculum*), and individually practiced science program for young students in British Columbia, Canada.

## RESULTS AND CONCLUSIONS

In brief, when the heavy curriculum, *wave-quantum-curriculum*, is not accompanied with updated technological pedagogical tools in a deliberative and positive collaborative learning environment, the student will not benefit from the planned curriculum and will not be able to easily progress and appreciate learning. As such, I emphasize a deliberative and constructive

collaborative learning environment where students can thrive with the use of updated technological pedagogical tools in their learning and science education. Consequently, teachers should motivate and intellectually engage students in science learning since balancing matters here (for successful flotation of the cruise ship in water, buoyant force/thrust should be equal or more than the weight of cruise).

## REFERENCES

- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Dewey, J. (1902). *The Child and the Curriculum*. The University of Chicago Press.
- Dewey, J. (1916). *Democracy and Education*. Champaign Ill, Project Gutenberg. [http://pdfbooks.co.za/library/JOHN\\_DEWEY-DEMOCRACY\\_AND\\_EDUCATION.pdf](http://pdfbooks.co.za/library/JOHN_DEWEY-DEMOCRACY_AND_EDUCATION.pdf)
- Dewey, J. (1929). *The Sources of a Science of Education*. New York: Liveright.
- Schwab, J. (1969). The practical: A language for curriculum. *The School Review*, 78(1), 1-23. <http://www.jstor.org/stable/1084049>