Can Old-Quantum-Theoretical description of Physical Reality be considered worth teaching?

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Even though the Old Quantum Theory (OQT) has long been integrated into high school curricula, research conducted in Physics Education (PE) generally focuses on single topics (mainly black-body spectrum, photoelectric effect, and Bohr's atomic model), lacking a comprehensive and unified approach, and leaving a significant gap in providing a coherent pedagogical, historical, and conceptual presentation. In line with most results in PE research, we do not believe that solely relying on the OQT is the most suitable and effective way to introduce Quantum Physics (QP). Nevertheless, we believe that dealing with the OQT could aid in grasping why Quantum Mechanics (QM) is just the way it is, facilitating the understanding of the difficulties inherent in this theory. And given also the current status quo, with teachers and textbooks still waiting at the "OQT stop", it becomes fundamental to look and research in this direction. Is it thus possible for the OQT to be effectively and meaningfully presented? What are the disciplinary and learning knots? And which aspects of OQT are important for the axiomatic construction of QM? In light of these research questions, a 15-hour path titled "Old (but Gold) Quantum Theory" was designed and tested in early 2023 with 36 high-school students and 9 teachers. Meetings included commented readings of original papers, groupworks, and both qualitative and quantitative examples. A second edition of the path is planned for early 2024. Moreover, a further experimentation, as an introduction to QM, is running in Fall 2023, with 144 students and 84 teachers. The paths are based on a comprehensive historical and pedagogical reconstruction of the birth and development of QP (part of a PhD research project), the primary aim of which is to establish an epistemological and educational framework crucial for fostering a meaningful cultural comprehension of QM. This work will delve into some of these aspects, taken as examples.

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