

Exploring Teaching/Learning Properties of Matter: A Cross-Country Study

venerdì 1 dicembre 2023 10:45 (22)

The physics of matter is one of the most crucial research lines in the last 30 years of physics research, but a coherent vertical path in that field is not present in curricula. In particular, properties of matter are often overlooked or superficially addressed in curricula and textbooks. Therefore, there is a need for research on educational proposals. We approached the problem by reviewing the literature on teaching and learning properties of matter in physics education. After identifying specific criteria, we conducted a comprehensive search of the Web of Science and Google Scholar databases, retrieving 1420 papers and selecting 15 publications that met the specified criteria. Upon analyzing the selected articles, it became evident that they could be effectively categorized under four different sections. In parallel, we conducted a survey of 195 teachers to explore the perspectives and practices of primary and middle school teachers on properties of matter in Italy and Turkey. The findings highlighted significant differences in the subtopics and concepts emphasized, as well as the teaching methods used by teachers. Interestingly, there were significant differences in teachers' perspectives based on the country they worked in, but no significant differences in their practices were observed when considering the associated country or school level. This suggests that a teacher's geographical location has a more pronounced impact on their teaching perspectives regarding properties of matter than the school level where they teach. In light of these results, we have prepared an interview protocol and are now exploring in depth the perspectives and practices of primary and middle school teachers.

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Session Classification : Sessione 6 – Chair: I. Testa (Università degli Studi di Napoli Federico II)