

Deconstructing the mole using sociological filters to explore science students' mole concept experiences

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Abstract:

The mole is an SI (Système International d'Unités) unit of measurement not different from the other SI units like the meter (m) which measures Length, the kilogram (kg) which measures Mass, Time measured in seconds (s) etc. But the mole as a unit of measurement does not render itself easy for comprehension or interpretation, as it confuses both learners and instructors according to some studies. It has therefore attracted a lot of research.

Some of the difficulties associated with the teaching and learning of the mole has created structural inequalities not only in the access of science in general, but also in participation and outcomes as well. These inequalities are more visible with students from low socio-economic backgrounds.

This study is aimed at deconstructing the mole, to highlight some of the difficulties already uncovered by other studies and to provide a remedy for the persistent inequalities.

Other studies have relied on scientific inquiry of the positivist paradigm, using quantitative methodology; this research takes a different approach, by using narrative inquiry which is a qualitative methodology of the interpretive paradigm. The mole is a scientific concept, but the teaching and learning is done socially as

education is a social phenomenon.

The research explores the role of sociological factors that shapes science students experiences of the mole concept, which is a well-researched concept that provides an important link between theoretical /abstract and practical science.

The mole concept is socially constructed within the science community, as the chemist define it as 'the amount of substance equivalent to twelve grams of carbon¹², while the physicists would be more interested in the number of particles in a mole by applying a mathematical constant (Avogadro constant), with yet the pharmaceutical and healthcare scientists will be interested in millimoles (one thousandths of a mole) as they deal with very minute quantities of substances.

Twenty-five students from London metropolitan university responded to the questionnaire, which was used as a recruitment tool due to covid-19 restrictions, of which nine took part (5 in a focus group and 4 one-to-one) in narrative interviews used to capture their experiences. The students range from foundation in science to PhD in pharmacology. Three lecturers (all academic doctors) with varying mole concept teaching experiences, one has done post-doctoral work at Manchester and Oxford universities as a chemistry lecturer and another had 30 years of Open university previous chemistry teaching experiences), also took part in one-to-one interviews, to explore the Bourdieusian field.

These narrative interviews were designed to explore Bourdieusian factors of habitus, field and forms of capital and will be analysed as such. The questions explored their conceptual / procedural mole concept experiences as well as the Bourdieusian factors.