NATURAL SCIENCES_ SENIOR PHASE_ MWAZVITA CHIKOPO_ 23-04-2021

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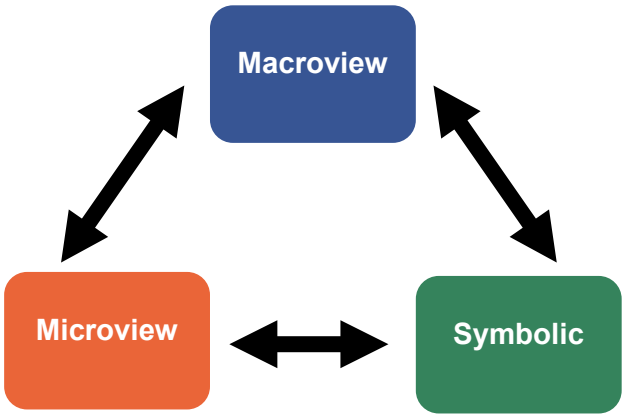
FRAMEWORK FOR CONCEPTUAL DEVELOPMENT IN CHEMISTRY

JOHNSTONE'S TRIANGLE

The three levels of science thought (macro, micro, symbolic), identified by Johnstone and represented by a triangle, may be viewed as a core closed-cluster concept map of the type advocated in the systemic approach to teaching and learning of chemistry.

THE CHEMIST'S TRIANGLE: A MODEL FOR TEACHING CHEMISTRY



Johnstone describes this as multilevel thought in chemistry. In his words;

- ✓ The **macro** and tangible: what can be seen, touched and smelt;
- ✓ The **sub-micro**: atoms, molecules, ions and structures; and
- ✓ The representational: **symbols**, formulae, equations, molarity, mathematical manipulation and graphs."

EXAMPLE:

During a chemistry lesson, we often toggle between the three levels: Johnstone describes how a ***macroscopic*** *phenomenon of salt dissolving in water can be explained using* ***microscopic*** *interactions between the ions and water; it described* ***symbolically*** *using a chemical equation. Therefore, these three levels of chemistry form the three vertices of Johnstone's Triangle, all three of which must be mastered to gain a true understanding of chemistry.*