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VERBAL, VISUAL AND DIGITAL CLASSROOM COMMUNICATION FOR EFFECTIVE SCIENCE LEARNING: INSIGHTS FROM INTERNATIONAL STUDIES

H.V.A.K.K Dissanayaka*

Postgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka.
*Shadowzash88@gmail.com

Classroom communication plays a vital role in shaping effective learning environments, particularly in science education. Conceptual understanding in science refers to a student's ability to grasp scientific ideas thoroughly, express them using their own language, use them to solve unfamiliar challenges, and relate this understanding to everyday situations. The objective of this review is to understand how effective classroom communication supports students in making sense of science concepts, especially in improving their learning experiences at the secondary school level. Total of 45 peer-reviewed articles published after 2015 were selected from academic databases such as Google Scholar and ResearchGate. This review considered studies conducted in both developing countries (India, Malaysia, Indonesia, Uganda, Iraq, Iran, and Sri Lanka) and developed countries (USA, UK, Australia, Sweden, Germany, China, Netherlands, Finland and Cyprus). The articles were analysed using a narrative synthesis approach, involving the summarisation of research methods and key findings, and the identification of patterns across different contexts to understand how communication influences effective science learning. Among the research articles reviewed, 58% focused on effective communication in learning, 18% examined verbal communication, and 4% addressed non-verbal communication. Additionally, 9% of the studies focused on digital communication, while 7% explored the integration of visual aids into instructional communication. The analysis revealed that both verbal and non-verbal communication significantly influence student achievement. Furthermore, integrating visual aids with verbal and non-verbal communication, as well as incorporating digital communication into science education, was found to be effective for enhancing science learning. The reviewed literature emphasised how incorporating multiple modes such as visuals, text, audio, and video can enhance students' conceptual understanding of science.

Keywords: Conceptual understanding, Digital communication, Instructional communication, Non-verbal communication, Verbal communication