A Multimodal Approach to Teaching Science

Example of a Physics Lesson

Lesson objective: Students to describe the movement of particles and the transfer of energy in transverse wave motion. In particular, students need to discern that the particles in a wave vibrate about a fixed point instead of moving along with the forward propagation of the wave.

Motivation for the design of this lesson
Students have difficulties observing the vibration of the wave particles amidst the dynamic fast-changing motion of a wave. Students also have difficulty linking what is happening in given wave diagrams to scientific terminologies such as vibration, kinetic energy, transfer, fixed position, medium, perpendicular, and adjacent particles

Lesson Design: The teacher deliberately designed the lesson to involve multiple modes of representation and scaffolded students' effort to translate their understanding from one mode of communication to another mode.

Teaching/Learning Activity	Integrated Literacy Inquiry Model	Modes of Representation	Instructional Rationale
Students carried out a hands-on activity in pairs using a rope	Observing/conducting an experiment	Physical (sensory and kinesthetic)	Students to generate a physical representation of the wave motion
Students to represent what they experienced in the rope activity into words and diagrams in a worksheet	Writing and drawing observations Translating inscriptions from one form to another (from visual to written)	Written and Visual	Students to describe the wave motion observed using key words and drawing Partial diagrams are provided for students to label and to draw arrows to indicate the directions of the motion
Students verbally explain to the teacher their preliminary ideas about wave motion	Presenting explanations using the PRO structure	Verbal	Students to explain the premise and reasoning. Teacher to check for students' understanding. Teacher provides explicit scaffolding to highlight the scientific concepts involved, using the

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			appropriate scientific language and role modeling what is required in translating from one mode of communication to another.
Students return to worksheet to use what they have learnt to a similar phenomenon (how energy is transferred in a ripple produced by dropping a pebble into a pond)	Explaining a new but related phenomenon	Visual and Written -a visually scaffolded writing exercise	Students to explain a related phenomenon, this time incorporating the appropriate scientific language and the PRO structure Diagrams are provided to guide students through the written explanation.

Tips:

- It is important to deliberately plan lessons to involve several sequential stages of re-representation.
- It is also important in adopting a multimodal approach to designing lessons to think through how the different literacy skills involved in doing, writing, drawing, and talking are integrated and how they reinforce one another in helping students to make sense of their learning.

Adapted from Tang, K.-S. K., Ho, C., & Putra, G. B. S. (2016). Developing multimodal communication competencies: A case of disciplinary literacy focus in Singapore. In Hand, B., McDermott, M. & Prain, V. (Eds.),*Using multimodal representations to support learning in the Science classroom* (pp. 135-158). Switzerland: Springer International Publishing.