



Teaching strategy: Concrete, representational, abstract (CRA)

Overview:

The Concrete, Representational (Pictorial), Abstract model (CRA) is based on Jerome Brunner's theory of cognitive development: enactive (action-based), iconic (image-based) and symbolic (language-based). Typically, a child will start by experiencing a new concept in a concrete, action-based, form. Move to making a representation of the idea, in pictures or more sophisticated diagrams and then to using abstract, symbolic notation. Students do not always pass through these stages in a linear fashion, nor are they specific to different age groups. Students are able to build visual models of complex ideas that helps to deepen their learning.

Although concrete manipulatives are common in lower primary they can (and should) be used throughout schooling. There are many available virtual manipulatives (digital representations of concrete manipulatives, not games) that can be used when the physical manipulatives are not available.

When using manipulatives, it is important that the connections to the mathematics being learnt and how to use the manipulative is made clear.

The teacher:

- explains the learning intention for the lesson
- models the concept using a manipulative
- explains how to use the manipulative in connection to the specific concept being taught
- allows students time to familiarize themselves with the concrete (virtual) materials
- demonstrates how to annotate and represent the physical objects, moving students to the representational stage
- connects the abstract notation to the concrete and representational stages
- plans lessons with the use of concrete or virtual materials embedded
- ensures manipulatives are available in the classroom, concrete or virtual
- creates a classroom culture where using concrete materials is common for all learners

The students:

- know how to use a range of concrete/virtual manipulatives
- feel comfortable to use concrete/virtual manipulatives in their learning
- can make the connections between the concrete materials, drawings and abstract notation
- Know when they have achieved the lesson goal – feel success



Example of the strategy in action:

This article explains a typical sequence of instruction using the CRA approach when teaching fractions:

<http://165.139.150.129/intervention/ConcreteRepresentationalAbstractInstructionalApproach.pdf>