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Coding and decoding representations of 3D shapes.

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Summary: The aim of this study is to examine students' ability in interpreting and constructing plane representations of 3D shapes, and to trace categories of students that reflect different types of behaviour in representing 3D shapes. To achieve this goal, one test was administered to 279 students in grades 5–9, and forty of them were interviewed. The results of the study showed that the representation of 3D shapes is composed of two general representing/cognitive abilities, coding and decoding. Decoding refers to interpreting the structural elements and geometrical properties of 3D shapes in plane representations, while coding refers to constructing plane representations and nets of 3D shapes, and translating from one representational mode to another. A mixed-method analysis showed that four categories of students can be identified that describe four types of behaviour and explain students' reasoning patterns in representing 3D shapes.

Classification: G43 C43
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