Van Hieles’ Level of Understanding Geometry

Van Hieles’ model consists of five distinct levels: Visualization, Analysis, Informal Deduction (Order), Deduction, and Rigor. Based on van Hieles’ scheme, instruction is designed according to a scheduled sequence. The objective is to lead the students to a higher level of thinking. A brief description of the levels of understanding geometry based on the van Hieles are as follow:

- **Level 0**: Visualization, students see geometric figures as a whole, but do not identify the properties of figures as at the next level.
- **Level 1**: Analysis, student can identify the figures, their features and characteristics properties even though they do not understand the interrelationship between different types of figures, and they also cannot fully understand or appreciate the uses of definitions at this level in contrast to understanding and performance at the next level.
- **Level 2**: Informal Deduction (Order), students can understand and use definitions. Concept nesting is understood and accepted as in the case of every square being a rectangle. They are able to make simple deductions and may be able to follow formal proofs but do not understand the significance of working in an axiomatic system and are not able to construct proofs meaningfully on their own at this level.
- **Level 3**: Deduction, students can construct proofs at this level as a way of developing geometry theory. The interrelationship between undefined terms, definitions, axioms/postulates, theorems, and proof is understood and used. However, at this level they are limited and not at a level of being able to work in a variety of axiomatic systems, and the rigor of logical and geometrical methods as at the next level.
- **Level 4**: Rigor, students understand logical and geometrical methods. They are able to work in a variety of different axiomatic systems. They are able to appreciate the historical discovery of non-Euclidean geometries and the freeing of geometry from physical materialism. They understand how a multitude of distinctly different geometries can exist, be developed, investigated, and used. They can also appreciate how a particular geometry (e.g., Euclidean) can be studied from different perspectives with different methods (synthetic, analytic, transformational).