

Examining Geometric Thinking Behaviours of Undergraduates in Online Geometry Course

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Abstract : Geometry is considered an important strand in mathematics due to its wide-ranging utilitarian value and because it serves as a building block for understanding other aspects of undergraduate mathematics, including algebra and calculus. Matters regarding students' geometric thinking have therefore long been pursued by mathematics researchers and educators globally via different theoretical lenses, curriculum reform efforts, and innovative instructional practices. However, so far, studies remain inconclusive about the instructional platforms that effectively promote geometric thinking. At the University of Education, Winneba, an undergraduate geometry course was designed and delivered on UEW Learning Management System (LMS) using Moodle platform. This study utilizes van Hiele's theoretical lens to examine the entry and exit's geometric thinking behaviours of prospective teachers who took the undergraduate geometry course in the LMS platform. The study was a descriptive survey that involved an intact class of 280 first-year students enrolled to pursue a bachelor's in mathematics education at the university. The van Hiele's Geometric thinking test was used to assess participants' entry and exit behaviours, while semi-structured interviews were used to obtain data for triangulation. Data were analysed descriptively and displayed in tables and charts. An Independent t-test was used to test for significant differences in geometric thinking behaviours between those who entered the university with a diploma certificate and with senior high certificate. The results show that on entry, more than 70% of the prospective teachers operated within the visualization level of van Hiele's geometric thinking. Less than 20% reached analysis and abstraction levels, and no participant reached deduction and rigor levels. On exit, participants' geometric thinking levels increased markedly across levels, but the difference from entry was not significant and might have occurred by chance. The geometric thinking behaviours of those enrolled with diploma certificates did not differ significantly from those enrolled directly from senior high school. The study recommends that the design principles and delivery of undergraduate geometry course via LMS should be structured and tackled using van Hiele's geometric thinking levels to serve as means of bridging the existing learning gaps of undergraduate students.

Keywords : geometric thinking, van Hiele's, UEW learning management system, undergraduate geometry

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