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# Didactical and Semiotic Affordance of GeoGebra in a Productive Mathematical Discourse

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**Abstract :** Using technology to expand the learning space is critical for a productive mathematical discourse. This is a case study of two teachers who developed and enacted GeoGebra-based mathematics lessons following their engagement in a two-year professional development. The didactical and semiotic affordance of GeoGebra in widening the learning space for a productive mathematical discourse was explored. The approach of thematic analysis was used for lesson artefact, lesson observation, and interview data. The results indicated that constructing tools in GeoGebra provided a didactical milieu where students used them to explore mathematical concepts with little or no support from their teacher. The prompt feedback from the GeoGebra motivated students to practice mathematical concepts repeatedly in which they privately rethink their solutions before comparing their answers with that of their colleagues. The constructing tools enhanced self-discovery, team spirit, and dialogue among students. With regards to the semiotic construct, the tools widened the physical and psychological atmosphere of the classroom by providing animations that served as virtual concrete to enhance the recording, manipulation, testing of a mathematical idea, construction, and interpretation of geometric objects. These findings advance the discussion of widening the classroom for a productive mathematical discourse within the context of the mathematics curriculum of Ghana and similar Sub-Saharan African countries.

**Keywords :** GeoGebra, theory of didactical situation, semiotic mediation, mathematics laboratory, mathematical discussion
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