ABSTRAK

Aditya Mohammad Iqbal. NIM. 1192050004. Pengembangan *Hypothetical Learning Trajectory* (HLT) berbantuan geogebra melalui *project-based learning* (PJBL) untuk meningkatkan kemampuan representasi matematis siswa

Kemampuan representasi matematis menjadi fondasi esensial untuk menerjemahkan gagasan abstrak ke dalam bentuk visual. Namun realitas di lapangan kemampuan tersebut belum optimal masih jauh dari harapan. Penelitian bertujuan untuk merancang, memvalidasi, serta menguji implementasi *Hypothetical Learning Trajectory* (HLT) berbantuan GeoGebra melalui *Project-Based Learning* (PjBL) untuk meningkatkan kemampuan representasi matematis siswa. Penelitian menggunakan model pengembangan Four-D (*Define, Design, Develop, Disseminate*) dan melibatkan 64 siswa kelas VIII dari MTs Swasta di Bandung. Instrumen tes kemampuan representasi matematis, non tes berupa angket, wawancara, observasi dan dokumentasi. Hasil temuan menunjukkan bahwa validasi ahli berada pada kategori layak, dengan rata-rata Aiken's V sebesar 0,691. Implementasi HLT menunjukkan efektivitas peningkatan kemampuan representasi matematis yang signifikan termasuk kategori tinggi. Kepraktisan berada pada kategori Baik. Penelitian HLT yang dihasilkan menjelaskan perkembangan strategi berpikir siswa serta proses transformasi dan koordinasi antar representasi matematis secara dinamis melalui prinsip desain pembelajaran yang dapat membantu guru mengembangkan kemampuan representasi matematis melalui eksplorasi, scaffolding, refleksi, dan generalisasi.

Kata Kunci: GeoGebra, *Hypothetical Learning Trajectory*, Kemampuan Representasi Matematis, *Project-Based Learning*, *Research and Development*.

ABSTRACT

Aditya Mohammad Iqbal. Student ID 1192050004. ***The Development of a GeoGebra-Assisted Hypothetical Learning Trajectory (HLT) through Project-Based Learning (PjBL) to Improve Students' Mathematical Representation Ability.***

The ability to mathematical representation becomes an essential foundation for translating abstract ideas into visual form. However, the reality in the field is that this ability is not optimal, it is still far from expectations. The research aims to design, validate, and test the implementation of GeoGebra-assisted Hypothetical Learning Trajectory (HLT) through Project-Based Learning (PjBL) to improve students' mathematical representation skills. The research used the Four-D (Define, Design, Develop, Disseminate) development model and involved 64 grade VIII students from Private MTs in Bandung. Mathematical representation ability test instruments, non-tests in the form of questionnaires, interviews, observations and documentation. The findings showed that expert validation was in the feasible category, with an average Aiken's V of 0.691. The implementation of HLT showed a significant increase in the ability of mathematical representation including the high category. Practicality is in the Good category. The resulting HLT research explains the development of students' thinking strategies as well as the process of transformation and coordination between mathematical representations dynamically through the principles of learning design that can help teachers develop mathematical representation skills through exploration, scaffolding, reflection, and generalization.

Keywords: *GeoGebra, Hypothetical Learning Trajectory, Mathematical Representation Ability, Project-Based Learning, Research and Development.*