

# **Development of e-Self Diagnostic Desktop Application (EDDA) Instruments Aspects of Concept Understanding and Mathematical Representation in High School Physics Learning.**

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## **ABSTRACT**

The purpose of research was to determine: (1) the feasibility of the e-Self Diagnostic Desktop Application (EDDA) in detecting weaknesses in understanding concepts and mathematical representations of high school students. (2) students' responses to EDDA in detecting weaknesses in understanding concepts and mathematical representations of high school students. (3) a description of the weakness of understanding concepts and mathematical representations based on measurements using EDDA on impulse and momentum materials.

The research is conducted using research and development (R & D) 4D models (Define, Design, Develop, Disseminate) combined with the test development stage by Oriundo. The subject of product trials was conducted on 11th grade students of MIPA at SMA Muhammadiyah 1, 2, 3, 5, and 7 Yogyakarta. The subject of the implementation test was carried out on 10th grade students of MIPA at SMA Muhammadiyah 2 Yogyakarta. The instruments developed were the EDDA product feasibility sheet, the question eligibility assessment sheet, the concept understanding diagnostic sheet and mathematical representation of impulse and momentum subject matter, and student response questionnaire sheets. Instrument feasibility analysis was based on calculations using Aiken V and empirically analyzed using the Item Response Theory (IRT) approach which includes item fit 1 PL and item difficulty. Analysis of student responses used a standard scale. The analysis of the weakness of understanding concepts and mathematical representations was described according to the percentage of student responses.

The results showed that: (1) the EDDA instrument was suitable for diagnosing the understanding of concepts and mathematical representations of high school students on impulse and momentum material based on the Aiken V criteria, item fit 1 PL, and the characteristics of the item difficulty level; (2) the students' responses to EDDA were in the "good" category, and (3) the description of the weakness of understanding the concept showed that most students were weak on the indicators of implementing the concept, while mathematical representation of students was the most weak on the indicators of operating equations.

Kata Kunci: *concept understanding, diagnostic test, impulse and momentum, mathematical representation*