ABSTRACT

Sri Hartanti Pratami S, 2026. ***Application of AR-Based PjBL E-Worksheet to Improve Students' Responsiveness in Problem-Solving Planning on the Concept of Insects (Development of the 4th Indicator of Digital Habits of Mind). Supervised by*** **Prof. Dr. Cartono, M.Pd., M.T dan Dr. Ida Yayu Nurul Hizqiyah, M. Si.**

This study aimed to examine the effectiveness of applying Project Based Learning (PjBL) E-Worksheet based on Augmented Reality (AR) in enhancing students' responsive problem-solving planning ability in insect concept learning as the development of the 4th Digital Habits of Mind (DHoM) indicator. A pre-experimental design (one-shot case study and one-group pretest-posttest) was employed involving 32 10th-grade students at SMA Pasundan 2 Bandung. The E-Worksheet was developed using Wizer.me integrated with Sketchfab-based 3D AR models of pollinator insects. Data on responsive ability were collected through observational rubrics measuring three sub-indicators (solution formulation, solution evaluation, implementation planning), cognitive data through pretest-posttest, student responses through questionnaires, and performance through Peer Group Assessment. Non-parametric statistics (Wilcoxon test and Spearman's Rho Correlation) were applied. Results showed that: (1) responsive ability was in the high category (mean = 7.11; collaborative average = 91.7%); (2) conceptual mastery improved significantly with mean N-Gain = 0.72 (high category), Wilcoxon $Z = -4.921$; $p < 0.001$; (3) student responses were highly positive (86.3%–100%); (4) there was a significant positive correlation between responsive ability and conceptual mastery ($r = 0.531$; $p = 0.002$); and (5) group performance averaged 86% (Very Good). A significant negative correlation between performance scores and cognitive achievement ($r = -0.393$; $p = 0.026$) was also found, indicating a quiet achievers phenomenon in collaborative learning. It is concluded that AR-based PjBL E-Worksheet effectively develops students' responsive ability as the 4th DHoM indicator.

Keyworld: E-Worksheet, Project Based Learning, Augmented Reality, Digital Habits of Mind, Responsive Ability, Pollinator Insects