

## THE USE OF MULTIMODAL REPRESENTATION IN THE PHYSICS LEARNING MATERIAL DEVELOPMENT TO PROMOTE STUDENTS' COGNITIVE AND CRITICAL THINKING COMPETENCES

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### ABSTRACT

The research was aimed to develop physics learning material by infusing multimodal representation to promote students' cognitive and critical thinking competences. Additionally, the developed learning material would be compared with the physics textbook used by many schools. The study employed Research and Development as the research method. The samples were 54 students of grade XI from one of senior high schools in Bandung; 28 students in experiment group and 26 students in control group. The instruments were cognitive competence and critical thinking tests. The collected data were analyzed by measuring the normalized average gain percentage and Cohen's d. The results of cognitive and critical thinking competences showed that Cohen's d value were 1.66 and 1.63 which were classified as high categories. From the study it could be concluded that design of physics learning material by involving the multimodal representation was more effective to promote students' cognitive and critical thinking competences than the physics text book used in the school.