

# **Analysis of Online Learning Implementation for Effective Biology Instruction**

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## **ABSTRACT**

This systematic review was carried out to analyze the mode of multiple external representations (MERs) used in e-learning implementation for biology instruction conducted by contemporary research, and reveal the values, either advantages or disadvantages, of the MERs in biology teaching and learning using e-learning. Four stages of review were conducted, started with browsing the publication data base, selecting and collecting the relevant articles, reviewing and analyzing the selected research papers, and figuring out the findings in accordance to the review purposes. Initially there were 105 articles collected in the first phase by which then reduced to 74 useful articles analyzed. A qualitatively inductive analysis was particularly administered in this review study. The findings show that there are six modes of MERs used in e-learning for biology teaching and learning which each mode has its characteristic of implementation. For their application in online learning, there are advantages as well as disadvantages revealed and further discussed in this publication.

Kata Kunci: *biology instruction, e-learning, review*