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Integration of STEM Biology in Physics Learning Oriented Toward 21st-Century Skills

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ABSTRACT

This study aimed to analyze the effect of STEM–Biology integrated physics learning on junior high school students' 21st-century skills, including critical thinking, creativity, collaboration, and communication. The study employed a quantitative approach using a quasi-experimental design with a nonequivalent control group design. The research was conducted at SMPN 2 Peusangan during the even semester of the 2024/2025 academic year, involving two eighth-grade classes as the experimental and control groups selected through purposive sampling. The experimental group received STEM–Biology integrated physics learning, while the control group received conventional instruction. Data were collected using written tests, 21st-century skills questionnaires, and observation sheets, and were analyzed using t-tests and N-Gain analysis. The results showed that the N-Gain score of the experimental group was in the moderate–high category (0.63), which was higher than that of the control group (0.34). Therefore, STEM–Biology integrated physics learning is effective in developing junior high school students' 21st-century skills.

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