

ABSTRAK

Agung Nugraha : Desain Pembelajaran PjBL Berbasis STEM Terintegrasi RTM (*Real-Time Temperature Monitoring*) Pada Konsep Sifat Koligatif Larutan untuk Meningkatkan Kemampuan Berpikir Tingkat Tinggi dan Mengembangkan Kreativitas Peserta Didik

Pembelajaran saat ini diarahkan pada pengembangan pembelajaran dengan mengintegrasikan sains, teknologi, *engineering*, dan matematika. Tujuan penelitian ini adalah untuk mengembangkan desain *Project Based Learning* (PjBL) berbasis *Science, Technology, Engineering, dan Mathematics* (STEM) yang diintegrasikan dengan pengembangan teknologi *Realtime Temperature Monitoring* (RTM) pada materi sifat koligatif larutan. Selain itu, penelitian ini juga bertujuan untuk melihat peningkatan kemampuan berpikir tingkat tinggi dan mengidentifikasi kreativitas peserta didik serta mengukur respon peserta didik terhadap pembelajaran yang dilakukan. Penelitian ini menggunakan pendekatan kualitatif-kuantitatif dengan jenis penelitian *Research and Development* (RnD). Pengumpulan data dilakukan dengan lembar validasi untuk pengembangan instrumen, lembar observasi keterlaksanaan pembelajaran, soal pretest-posttest kemampuan berpikir tingkat tinggi, lembar penilaian kreativitas, dan angket respon peserta didik. Analisis data dilakukan dengan analisis data kuantitatif melalui metode statistik deskriptif dan statistik inferensial. Hasil penelitian menunjukkan bahwa semua instrumen yang dikembangkan valid dan layak untuk digunakan. Pada proses pembelajaran, hasil observasi menunjukkan rata-rata keterlaksanaan pembelajaran mencapai 97,18%. Pada kemampuan berpikir tingkat tinggi, hasil pengujian menunjukkan adanya perbedaan kemampuan berpikir tingkat tinggi peserta didik setelah pelaksanaan pembelajaran dengan kategori peningkatan sedang. Pada aspek kreativitas, terdapat 2 kelompok yang berada pada skala *observation of thinking*, 2 kelompok pada skala *thinking strategy*, dan 1 kelompok pada skala *reflection of thinking*. Hasil angket respon peserta didik menunjukkan rata-rata untuk setiap indikator adalah baik. Hal ini mengindikasikan bahwa pembelajaran PjBL-STEM terintegrasi RTM dapat meningkatkan kemampuan berpikir tingkat tinggi dan mengidentifikasi kreativitas peserta didik.

Kata Kunci : berpikir tingkat tinggi, kreativitas, PjBL-STEM, sifat koligatif larutan

ABSTRACT

Agung Nugraha : STEM Based PjBL Learning Design Integrated With RTM (Real-Time Temperature Monitoring) On The Concept Of Colligative Properties Of Solutions To Enhance Higher Order Thinking Skills And Develop Students' Creativity

Current learning is focused on developing learning by integrating science, technology, engineering, and mathematics. The purpose of this study is to develop a Project-Based Learning (PjBL) design based on Science, Technology, Engineering, and Mathematics (STEM) integrated with the development of Real-Time Temperature Monitoring (RTM) technology in the context of colligative properties of solutions. Additionally, this study aims to assess improvements in higher-order thinking skills, identify students' creative thinking abilities, and measure students' responses to the implemented learning process. This research uses a quantitative approach with a research and development (RnD) type of study. Data collection was conducted using a validation sheet for instrument development, an observation sheet for learning implementation, pretest-posttest questions on higher-order thinking skills, a creative thinking skills assessment sheet, and a student response questionnaire. Data analysis was conducted using quantitative data analysis through descriptive statistical methods and inferential statistics. The results of the study indicate that all developed instruments are valid and suitable for use. During the learning process, observation results showed that the average implementation of learning reached 97.18%. In terms of higher-order thinking skills, the test results showed differences in students' higher-order thinking skills after the implementation of learning with a moderate improvement category. In terms of creative thinking skills, there were 2 groups on the observation of thinking scale, 2 groups on the thinking strategy scale, and 1 group on the reflection of thinking scale. Meanwhile, the survey results indicate that interest and positive attitudes toward chemistry learning are in the very good category, accompanied by a high perception of the effectiveness of learning. This suggests that integrated PjBL-STEM learning with RTM can enhance higher-order thinking skills and identify students' creative thinking abilities.

Keywords: creative thinking, colligative properties of solutions, higher-order thinking, PjBL-STEM