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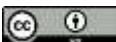


Bibliometric Analysis: Trends and Potential of Self-Regulated Learning (SRL) in Physics and SDGs

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2 ABSTRACT

Objective: This study aims to determine potential future research directions that can strengthen the integration between SRL and physics education in order to support the achievement of Sustainable Development Goals (SDGs), especially goal 4 on Quality Education. **Method:** This research was conducted using a quantitative descriptive approach, a bibliometric analysis study used data from the Scopus database to map trends and focuses on Self-Regulated Learning (SRL) research in international literature. **Results:** There is a global research trend in SRL and physics learning that supports the SDGs. The number of documents and citations increased from 2020 to 2025, resulting in 123 Scopus documents, with the highest number of citations in 2024, reaching 185. **Novelty:** The findings of the bibliometric analysis identified three main aspects of SRL research on physics materials and their influence on the SDGs, including the use of AI technology, relevant learning models, and learning processes. Future research directions hold great potential for integrating technologies such as AI and IoT devices into SRL to support the achievement of the Sustainable Development Goals (SDGs). This finding is in innovative learning planning focused on self-satisfaction in the era of technology adoption.

3 INTRODUCTION

This research is expected to align with the demands of 21st-century education, which emphasize critical, creative, and independent thinking skills for students (Masjudin, 2024). Through this research, learning strategies will emerge that can foster these three abilities, enabling students not only to receive information but also to process, evaluate, and apply knowledge innovatively in real life (Nilimaa, 2023). Therefore, the results of this research are expected to make a tangible contribution to improving the quality of learning that is adaptive to global challenges.

Furthermore, the importance of the Self-Regulated Learning (SRL) approach is expected to shape students who can regulate and direct their own learning processes (Ng et al., 2024), from planning and implementation to evaluation of learning outcomes (Kramarski & Heaysman, 2021). Through the application of SRL, students are expected to develop metacognitive awareness, intrinsic motivation, and a sense of responsibility for their learning progress (Ambaryani & Putranta, 2022). Thus, this research is expected to contribute to the implementation of learner-centered learning strategies and support independent learning in various educational contexts.

Furthermore, the implementation of Self-Regulated Learning (SRL) is expected to contribute to achieving the Sustainable Development Goals (SDGs) (Demir, 2024;