



## Psychological Approaches in 21st Century Learning to Improve the Quality of SDG Education Point 4 in Bibliometric Studies

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DOI : <https://doi.org/10.63230/jolabis.2.1.134>

### Sections Info

#### Article history:

Submitted: March 8, 2026

Final Revised: March 17, 2026

Accepted: March 17, 2026

Published: March 31, 2026

#### Keywords:

Bibliometric;

Learning;

Psychology;

Quality Education;

SDG 4.

### ABSTRACT

**Objective:** The research aims to comprehensively understand the various psychological challenges in learning in the 21st century education era. This approach not only helps identify dominant research themes, but also uncovers research areas that are still rarely studied, so that it can provide a stronger basis for formulating further research *directions* in the field of learning psychology that supports the transformation of quality education SDG point 4. **Method:** This research uses a literature study approach with bibliometric analysis methods to map the development of research related to psychological aspects in 21st century learning. Scopus data was obtained from 106 documents in 2016-2016 which were analyzed using the PRISMA design to determine the bibliometric distribution. **Results:** Research trends regarding psychological approaches to learning continue to increase in supporting 21st century education. Bibliometric analysis indicates that themes such as learning motivation, self-regulation, learner engagement, and experience-based learning are the main focus in current studies. Research contributions are also dominated by several countries that are actively developing pedagogical innovations to answer modern learning challenges. **Novelty:** The findings of this research indicate that the integration of psychological aspects in learning design is very important to improve the quality of education in the 21st century. Educators need to implement a learning model that is student-centered and supports balanced cognitive, emotional and social development. In addition, the results of this research can be a basis for developing educational policies that pay more attention to psychological well-being in the learning process.

## INTRODUCTION

21st-century education is expected to equip students with competencies that go beyond mastering knowledge to develop critical thinking, creativity, collaboration, and communication skills (Muldagaliyeva, 2023). This hope aligns with the United Nations' global agenda through Sustainable Development Goal 4, which emphasizes the importance of inclusive, fair, and quality education for all (Gunawan, 2025; Lintangesukmanjaya et al., 2025). In this context, education is no longer seen as simply a process of transferring information, but rather as a learning process that supports students' cognitive, affective, and social development. Therefore, learning approaches need to be designed with consideration of psychological aspects of learning, such as intrinsic motivation, curiosity, and students' active involvement in building their own understanding (Shen & Zhao, 2022).

21st-century skills are closely linked to developments in Educational Psychology and Cognitive Psychology. A psychological perspective holds that these skills are not only related to knowledge acquisition but also to mental processes such as information processing, self-regulation, decision-making, and the ability to reflect on complex problem-solving (Begum, 2025). In the context of learning, a psychological approach

helps understand how individuals construct knowledge through social interactions, learning experiences, and metacognitive processes that support the development of higher-order thinking skills (Rivas et al., 2022). Therefore, integrating psychological principles and developing 21st-century skills is crucial for designing learning strategies that enhance adaptability, problem-solving, and reflective decision-making in addressing the challenges of a knowledge- and technology-based society.

In line with this principle, education that supports learning psychology places students at the center of the learning process, enabling them to develop reflective abilities, self-regulation, and learning resilience to face the challenges of the digital era. A psychologically conducive learning environment allows students to feel safe exploring ideas, making mistakes, and improving their understanding independently (Hardie et al., 2022). Thus, the implementation of 21st-century education in line with Sustainable Development Goal 4 does not focus solely on access and the quality of education, but also on creating meaningful, humanistic learning experiences that support the holistic psychological development of students. This is an important foundation in forming a generation of lifelong learners who are adaptive to developments in science and technology (Gharahighehi et al., 2024).

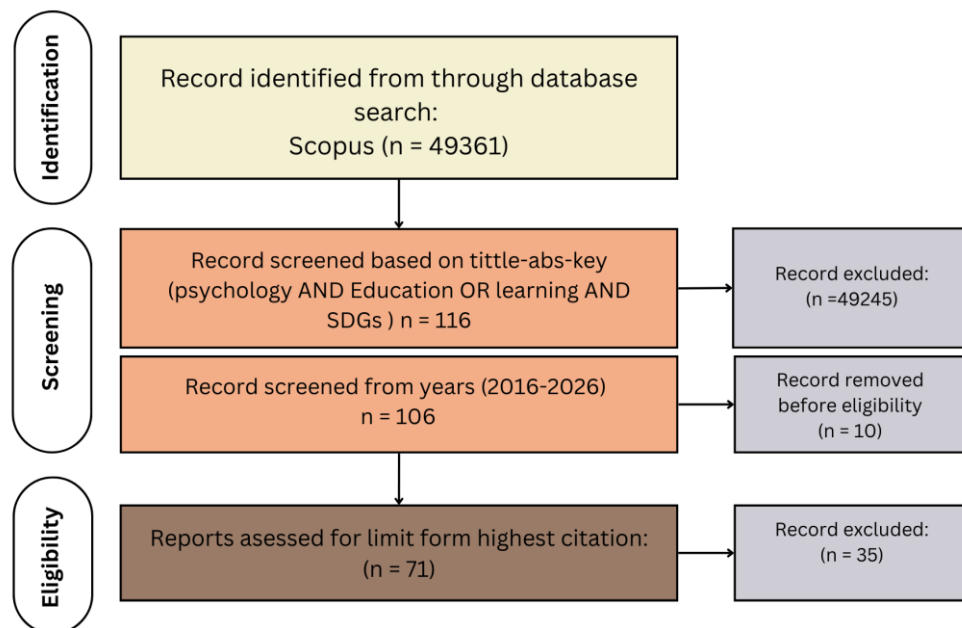
Although various 21st-century learning approaches have been developed to improve the quality of education, several psychological challenges in the learning process have not yet been studied in depth. The development of digital technology, very fast access to information, and the use of artificial intelligence in learning often give rise to new psychological phenomena in students, such as the tendency to depend on instant information, decreased persistence in deep thinking processes (George et al., 2024), and reduced reflective ability in understanding a concept. This challenge is not only related to cognitive aspects but also touches on the dimensions of motivation, self-regulation, and learning resilience, which are important parts of educational psychology (Darabi et al., 2023; Zhang, 2022). Until now, most research has focused on the effectiveness of learning models or strategies, while studies that specifically examine students' psychological dynamics in digital learning environments and smart technology are still relatively limited. This condition underscores the need for more in-depth research to understand how changes in the modern learning ecosystem affect students' psychological learning processes comprehensively (Nguyen et al., 2023).

To comprehensively understand the various psychological challenges in learning in the 21st-century educational era, a systematic literature review analysis is needed to map research developments, main themes, and research gaps that have not yet been widely explored. The literature review allows researchers to identify patterns of scientific thinking (Díaz et al., 2023), theoretical approaches, and research directions that have developed in the field of learning psychology and modern education. However, conventional literature review approaches often fall short in describing the relationships among research topics in a broad, objective manner. Therefore, the use of bibliometric analysis is a relevant methodological innovation to complement the study (Cui et al., 2023). Through this technique, researchers can map publication trends,

research collaboration networks, and the relationships among keywords in a field of study, quantitatively and visually. This approach not only helps identify dominant research themes but also uncovers research areas that are still rarely studied, thereby providing a stronger basis for formulating further research directions in the field of learning psychology that support the transformation of education in the 21st century.

## RESEARCH METHOD

This research uses a literature review approach with bibliometric methods to map the development of research on psychological aspects of 21st-century learning (Lintangesukmanjaya et al., 2025; Marlés-Sáenz et al., 2025). This approach involves collecting a set of scientific articles from reputable academic databases, then systematically analyzing them to identify publication trends, relationships between research topics, and patterns of researcher collaboration in that field. Bibliometric analysis allows researchers to obtain a more comprehensive picture of the structure of knowledge, the development of research themes, and study areas that still offer opportunities for further development (Cui et al., 2023). Thus, this method not only serves as a literature mapping study but also provides an analytical basis for identifying the direction of research on the psychology of learning in the context of 21st-century education.



**Figure 1.** PRISMA design

This research design follows the PRISMA framework to ensure that the article identification, screening, and selection process is carried out systematically and transparently (Agrawal et al., 2024). Through this approach, the research stage begins with the identification stage, which identifies relevant articles based on keywords, followed by the screening stage, which eliminates duplicate documents or those that do not match the research focus. Next, the eligibility stage was carried out to assess the suitability of the articles based on predetermined inclusion and exclusion criteria, and a

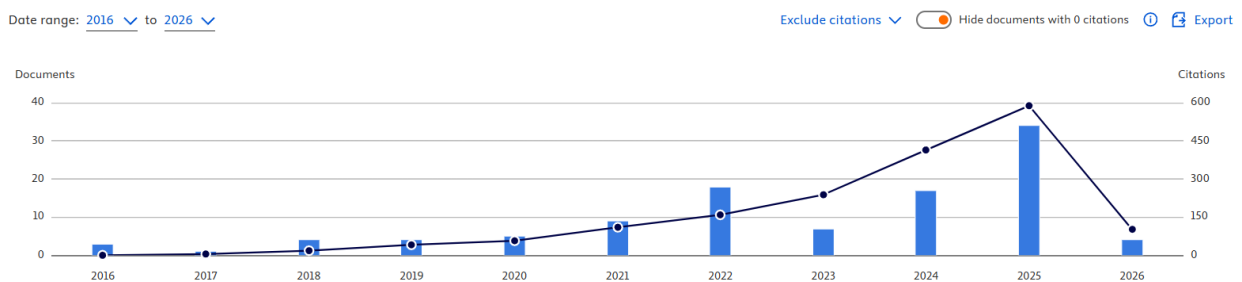
collection of articles was obtained that were used in the included stage as the main source of analysis.

All research data were obtained from the Scopus database because it provides wide international publication coverage and high index quality, enabling more comprehensive and credible literature mapping in bibliometric analysis. Bibliometric analysis was assisted by VOSviewer software. The use of VOSviewer in bibliometric research enables the analysis and visualization of relationships between publications after a systematic literature review using the PRISMA framework, thereby facilitating the identification of collaboration patterns, keyword relationships, and the development of research themes within a field of study (Lintangesukmanjaya et al., 2025).

## RESULTS AND DISCUSSION

### Results

The results of data searches using "psychology AND Education OR learning AND SDGs" yielded 71 high-citation documents. The data is visualized with VOSviewer to plot citation overviews, document counts, and research trends.

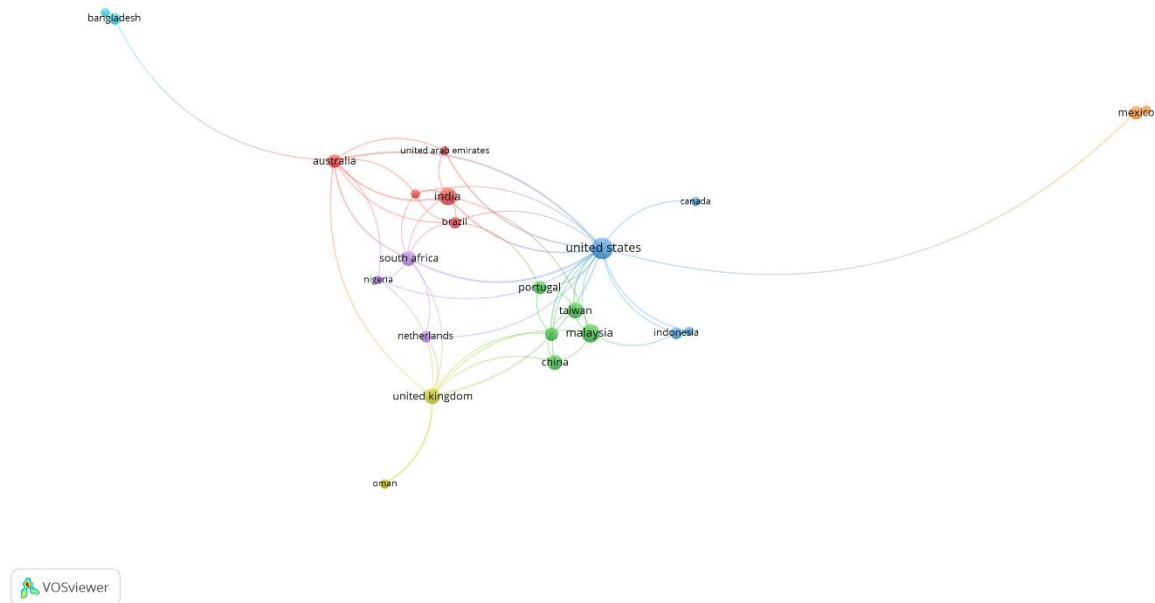


**Figure 2.** Citation overview

Based on the citation overview from the Scopus database in the period 2016–2026, it can be seen that there is a trend of gradually increasing the number of publications and citations in the research topics analyzed. In the initial period (2016–2019), the number of documents and citations was still relatively low, indicating that research in this field was still at an early stage of development. Entering 2020 to 2022, there will be a more significant increase in both the number of articles and citations, which indicates increasing academic attention to this topic. This trend becomes stronger in the 2023–2025 period, with the peak number of documents and citations occurring in 2025, indicating high research activity and the scientific impact of the publications produced. Meanwhile, the decrease in 2026 is likely due to limited indexing time and the ongoing citation accumulation process, considering that the data for that year was taken at the beginning of the year so the number of publications and citations had not yet been fully accumulated. This overall pattern shows that the research topic studied has increasingly developed and is relevant in academic discourse in recent years. Based on the results, these trends are now mapped in the form of visualization of keywords that appear in bibliometric analysis.



Apart from finding differences in link strength in keywords that appear in the bibliometric analysis, it was also found that country distribution influenced research trends.



**Figure 4.** State relations

Country analysis in bibliometric trends is important for understanding how the distribution of research contributions develops globally and for identifying centers of knowledge production in a field of study (Zhan et al., 2022). Through this analysis, researchers can see which countries have high publication intensity, strong international collaboration networks, and a dominant research focus. In a study of psychological approaches to 21st-century learning, the largest number of publications was found to come from the United States, India, Indonesia, Portugal, South Africa, the United Kingdom, and Malaysia. The dominance of these countries can be influenced by several factors, such as the strong tradition of educational research, government policy support for learning innovation, and increased attention to the integration of psychological aspects of learning to address the educational challenges of the 21st century. Countries such as the United States and the United Kingdom have well-established educational research ecosystems and many influential academic institutions, while developing countries such as India, Indonesia, Malaysia, and South Africa are showing increasing research contributions in line with educational reform efforts and the need to improve the quality of learning in the context of digital transformation and global competency demands. Portugal also makes a significant contribution by being active in educational research focused on pedagogical innovation, as well as in international collaboration within the European region. Overall, these country analyses illustrate the dynamics of research development and the potential for





Recent research also highlights the importance of self-regulation, a growth mindset, and psychological well-being in supporting successful learning. This shows that integrating a psychological perspective is an important basis for designing learning that is adaptive to technological developments and global competency needs. Thus, the development of psychological research in learning becomes a strategic part of supporting the transformation of 21st-century education into a more humane, student-centered system.

Learning models that emphasize psychological aspects in 21st-century education need to be designed to increase students' cognitive, emotional, and social involvement in a balanced way. One widely recommended approach is Problem-Based Learning, which encourages students to solve real problems through critical and collaborative thinking (Xu et al., 2023). Apart from that, the Inquiry-Based Learning approach is also relevant because it provides students with the opportunity to explore concepts through an inquiry process that encourages curiosity and self-reflection. Other learning models, such as Project-Based Learning, can also foster intrinsic motivation and social skills through meaningful project activities (Firdausih & Aslan, 2025). The application of these models helps create a learning environment that supports students' psychological development while improving higher-level thinking abilities. Thus, integrating activity- and experience-based learning models is an important strategy for developing learning that meets the demands of 21st-century education.

Educational evaluation in the current era no longer only assesses final learning outcomes but also considers the learning process and students' psychological development. Effective assessment should consider aspects of learning motivation, student involvement, and self-regulation that develop during the learning process (Heikkinen et al., 2025). A more holistic evaluation approach helps educators understand how students think, solve problems, and reflect on their learning experiences. In addition, process-based evaluation, such as formative assessment, can provide feedback that supports students' ongoing psychological and academic development. By paying attention to the psychological dimension in evaluation, the learning process can become more humane and support learning welfare. Therefore, integrating psychological values into educational evaluation is important to ensure that learning not only produces academic achievement but also optimal personal development for students.

Although bibliometric analysis provides a quantitative overview of the relevance of psychology research to the Sustainable Development Goals through publication and keyword mapping using tools such as VOSviewer, this approach has several limitations. Bibliometric analysis generally relies solely on publication metadata, such as titles, abstracts, and keywords. It thus may not fully represent psychology's conceptual or methodological contributions to the implementation of the SDGs in learning practices. Furthermore, database bias, limited journal indexing coverage, and variations in researchers' terminology can lead to relevant research not being identified in network analysis. Therefore, future research is recommended to combine bibliometric approaches with systematic content analysis or systematic literature

reviews to more comprehensively explore how psychological theories and approaches actually support the development of learning aligned with the Sustainable Development Goals.

## CONCLUSION

**Fundamental Finding:** This research shows that the trend toward psychological approaches to learning continues to grow in support of 21st-century education. Bibliometric analysis indicates that themes such as learning motivation, self-regulation, learner engagement, and experience-based learning are the main focus in current studies. Research contributions are also dominated by several countries actively developing pedagogical innovations to address modern learning challenges..

**Implication:** The integration of psychological aspects into learning design is crucial for improving the quality of education in the 21st century. Educators need to implement a student-centered learning model that supports balanced cognitive, emotional, and social development. In addition, the results of this research can serve as a basis for developing educational policies that place greater emphasis on psychological well-being in the learning process. **Limitation:** This research has limitations, as the data source is the Scopus database; therefore, relevant publications from other databases may not have been identified. In addition, the analysis is bibliometric, placing greater emphasis on mapping research trends rather than on in-depth analysis of each article's content. **Future Research:** Future research can expand data sources by integrating additional databases, such as Web of Science or Google Scholar, to obtain broader literature coverage. Future studies could also combine bibliometric analysis with systematic literature reviews or empirical studies to better understand the impact of psychological approaches on learning practices.

## AUTHOR CONTRIBUTIONS

**Indri Hapsari Khansa** contributed to the conceptual framework, research design, and validation process; **Rahmatta Thoriq Lintangesukmanjaya** was involved in methodology development, and data analysis; **Dwikoranto** wa involved in sourcing references, and drafting the manuscript; **Daniel Hakim** handled data management, project coordination, and manuscript drafting. All listed authors have reviewed and approved the final version of this submission.

## CONFLICT OF INTEREST STATEMENT

The authors confirm that there are no conflicts of interest, either financial or personal, that may have influenced the content or outcome of this study.

## ETHICAL COMPLIANCE STATEMENT

This manuscript complies with research and publication ethics. The authors affirm that the work is original, conducted with academic integrity, and free from any unethical practices, including plagiarism.

## STATEMENT ON THE USE OF AI OR DIGITAL TOOLS IN WRITING

The authors acknowledge the use of digital tools, including AI-based technologies, as support in the research and writing stages of this article. Specifically, Gemini AI was employed for untuk mengembangkan paraphrase dan grammar lebih baik. All outputs generated with digital assistance were critically evaluated and revised to ensure academic rigor and ethical standards were upheld. The final responsibility for the manuscript rests entirely with the authors.

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