Jurnal Literasi Pendidikan Indonesia (JLPI)

P-ISSN: 3109-8703 — E-ISSN: 3109-xxxx

https://journals.widhatulfaeha.id/index.php/jper/index

Research Trends in Creative Thinking Skills in Students' Physics Learning: A Bibliometrics Analysis

Dian Islamiyati[1]*, Aris Doyan[1], Syarful Annam[1]

[1]Master's Program in Science Education, Graduate School, Mataram University, Indonesia.
[2]Program in Physics Education, Faculty of Teacher Training and Education, University of Mataram, Indonesia.

Article Info

Article History
Received: February 3, 2026
Revised: February 10, 2025
Accepted: February 21, 2026
Published: February 28, 2026

***Corresponding Author**
Dian Islamiyati,
University of Mataram, Indonesia;
e-mail: islamidian99@gmail.com

Abstract

In the era of rapid technological advancement and increasing educational demands, the development of creative thinking skills in students' physics learning has become a critical focus to enhance higher-order thinking competencies and learning effectiveness. This study discusses research trends on creative thinking skills in physics learning from 2015 to 2024. The research method used is descriptive and analytical using data from Google Scholar. The results of the analysis show fluctuations in the increase in the number of publications during this period, with a decrease in 2019 and 2022 before increasing again in 2023. Key words that often appear in this research include creative thinking skills, physics teacher, PBL, and science learning. These findings make a significant contribution to 21st century education, emphasizing the importance of creative thinking skills in students' understanding of scientific concepts. This research shows that the development of new learning models can facilitate students' creative thinking skills in physics learning. Thus, this research provides insight into research trends that continue to develop and are relevant for improving the quality of education in the future.

Keywords: Creative Thinking Skills; Overview; Physics Learning.

INTRODUCTION

Creative thinking skills are essential competencies in today's society, particularly in addressing the challenges of the Industrial Revolution 4.0. Various higher-order thinking abilities, such as critical thinking, problem-solving, and analytical reasoning, are increasingly needed to help students navigate complex problems and make informed decisions in the 21st century (Alhafizin et al., 2025; Hidayatullah et al., 2025; Samadun & Dwikoranto, 2022). These skills enable individuals to become more flexible, open-minded, and adaptive in responding to various life situations and problems (Nurmantoro et al., 2022). In the context of education, improving the quality of learning cannot be separated from efforts to develop students' knowledge, attitudes, and skills through effective classroom processes (Uno and Umar, 2023). Munandar (2009) emphasized that education must be directed toward developing students' creativity so that they are able to contribute meaningfully to society and the state. Therefore, integrating creative thinking skills into learning activities is not merely an option but a necessity in modern educational practice, especially amidst rapid technological developments that demand educators to be more innovative in utilizing technology in the learning process (Hulwani et al., 2021; Rahmawati & Juandi, 2022).

In the context of students' physics learning, creative thinking skills contribute significantly to the development of higher-order thinking competencies (Kwangmuang et al., 2021; Setiawan et al., 2018). Physics learning at the junior high school level aims to equip students with logical, analytical, systematic, critical, and creative thinking skills, as well as the ability to collaborate. These competencies are essential for students to obtain, manage, and utilize information in dynamic and competitive environments (Tambunan, 2016). Natural science (IPA), including physics, is built upon scientific processes and attitudes, producing concepts, principles, and theories that apply universally (Trianto, 2010). Therefore, physics learning requires students not only to understand concepts but also to solve problems creatively, communicate ideas scientifically, and represent them using symbols, tables, and other media (Munfaridah et al., 2021; Badmus & Jita, 2024). Learning that stimulates students' creative thinking skills can help them express ideas and engage more actively in scientific inquiry (Beetlestone, 2011).

Many studies have focused on the development of innovative learning models, integration of technology, and the implementation of various instructional strategies to enhance students' creativity, in line with the demands of modern education (Hulwani et al., 2021; Rahmawati & Juandi, 2022). In addition, several studies have shown that the application of problem-based learning can significantly improve students' higher-order thinking skills, particularly critical thinking abilities, which are closely related to the development of creative thinking in science learning (Hiidayatullah &

Citation:
Islamiyati, D., Doyan, A., Annam, S. (2026). Research trends in creative thinking skills in students' physics learning: a bibliometrics analysis. *Jurnal Literasi Pendidikan Indonesia, 2*(1), 12–18.

Fatimah, 2025). The emphasis on creativity as a core educational outcome, as highlighted by Munandar (2009) and Nurmantoro et al. (2022), has encouraged researchers to explore diverse approaches in physics classrooms. These research efforts aim to improve learning effectiveness and address common problems in science education, such as students' limited conceptual understanding and lack of engagement (Trianto, 2010).

However, despite the growing number of studies on creative thinking skills in physics learning, several challenges remain. In practice, physics learning in many schools still relies heavily on conventional lecture-based methods, resulting in students being less active in problem-solving activities and less engaged in the learning process (Good et al., 2019; Ishlahul'Adiilah, 2023). This condition contributes to the low development of students' creative thinking skills and limited classroom interaction. Moreover, although numerous studies have been conducted, there is still a lack of comprehensive mapping of research trends, collaboration patterns, dominant themes, and research gaps in this field. Without a systematic overview, it is difficult to identify which areas have been extensively explored and which remain under-researched. This gap highlights the need for a bibliometric analysis to systematically examine the development, direction, and structure of research on creative thinking skills in students' physics learning.

Therefore, this study aims to analyze research trends related to creative thinking skills in students' physics learning using a bibliometric approach. This research seeks to identify publication growth, prominent authors, influential journals, collaboration networks, keyword co-occurrence patterns, and emerging themes in the field. The novelty of this study lies in providing a comprehensive and data-driven mapping of the intellectual structure and evolution of research in this area, which has not been systematically synthesized before. The results of this study are expected to provide strategic insights for researchers, educators, and policymakers in determining future research directions, developing innovative physics learning strategies, and strengthening the integration of creative thinking skills in science education.

MATERIALS AND METHODS

This study employed a descriptive–analytical design using a bibliometric approach to examine research trends in creative thinking skills in students' physics learning. Bibliometric analysis was used to systematically map the development, structure, and patterns of scientific publications in this field, including publication growth, citation performance, authorship patterns, and keyword co-occurrence (Yan & Zhiping, 2023). The data were retrieved from the Google Scholar database using the software Publish or Perish and Dimensions.ai as analytical tools. The search process was conducted using relevant keywords such as "creative thinking skills," "creative thinking," "physics learning," and "physics education," including combinations of these terms. The search was limited to publications published between 2015 and 2024 to capture recent research developments over the last decade.

A total of 500 documents indexed in Google Scholar were initially identified and exported using Publish or Perish. The database was selected because it indexes a wide range of scholarly works and has broad coverage in the field of education, often retrieving more documents than other major databases (Hallinger & Chatpinyakoop, 2019; Hallinger & Nguyen, 2020).

To ensure data relevance and quality, the screening and filtering process followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The PRISMA procedure involved identification, screening, eligibility assessment, and inclusion stages (Tricco et al., 2018). Duplicate records, documents unrelated to physics learning, non-scholarly publications, and incomplete bibliographic data were excluded. The final dataset was then analyzed descriptively to identify trends in publication output, citation metrics, leading authors, source titles, and thematic developments based on keyword analysis. Through this systematic and structured procedure, the study provides a comprehensive overview of the evolution and intellectual landscape of research on creative thinking skills in students' physics learning.

RESULT AND DISCUSSION

This research aims to describe research trends in creative thinking skills conducted from 2014 to 2023. Research document research trends in creative thinking skills in physics learning, taken from documents from 2015 to 2024. Below is presented in Figure 1 regarding research trends in creative thinking skills in physics learning.

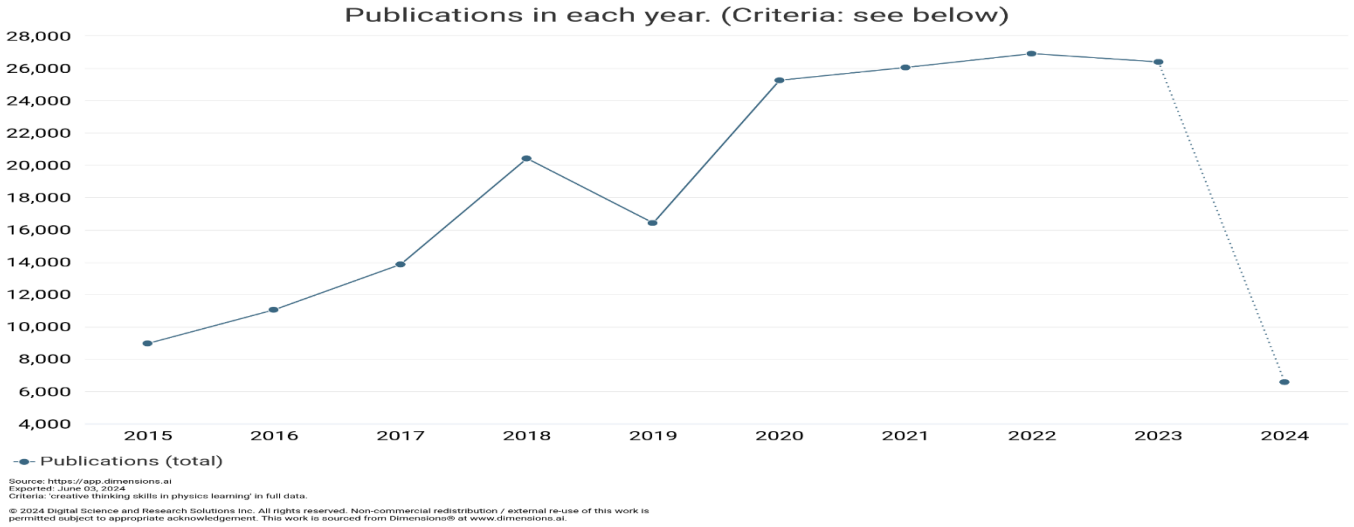

Figure 1. Research Trends in Creative Thinking Skills in Physics Learning

Figure 1 shows that the research trend of creative thinking skills in physics learning from 2015 to 2024 has increased and decreased. The increasing trend of research on generic science abilities in physics learning is caused by the modernization of education, which makes creative thinking skills very important because they can increase students' understanding of scientific concepts (Nastiti et al., 2018). Where the research trend shows an increase in the number of publications from 2015 to 2018. However, in 2019 the research trend for creative thinking skills in physics learning decreased from the previous year and the research trend increased again in 2020 and the research trend for creative thinking skills decreased again in 2020. 2023.

In 2015 there were 8 publications related to creative thinking skills in physics learning, and this increased to 20 publications in 2018, but decreased to 16 publications in 2019, and increased again until 2023 to 26 publications. This increasing research trend provides a deeper understanding of the problem of low creative thinking skills in physics learning and how to overcome this problem. Research can improve creative thinking skills through various methods. Below is also presented research on creative thinking skills in physics learning based on the type of publication.

Table 1. Trends in Generic Science Skills in Research Physics Learning Based on Publication Type

Publication Type	Publication
Chapter	106,799
Article	85,919
Edited Book	53,564
Monograph	49,021
Being processed	6,080
Preprint	2,936

Based on Table 1, it is known that generic science research in physics learning from 2015 to 2024 is contained in 6 types of publications. In the form of chapters totaling 106 documents, articles totaling 85 documents, edited books totaling 53 documents, monographs totaling 59 documents, proceedings totaling 6 documents, preprint 2 documents. Research trends on creative thinking skills in physics learning in the form of chapters are the type of publication that contains the most research on creative thinking skills in physics learning compared to other types of publications. Meanwhile, the type of publication that contains the least amount of research results on creative thinking skills in physics learning is a preprint. Below are also presented ten (10) titles of research trend sources for creative thinking skills in physics learning, which are often cited by other researchers in this regard.

Table 2. Top 10 Sources of Titles for Trends in Creative Thinking Skills in Physics Learning Research 2015-2024

Name	Publication	Quote	Meaning of Quotes
Physics Journal Conference Series	6,555	24,563	3.75
Behavioral and Brain Sciences	5,779	123,654	21.40
Computer Science Lecture Notes	2,803	17,163	6.12
SSRN Electronic Journal	1,365	6,619	4.85
Advances in Social Sciences, Education and Humanities Research	1,168	961	0.82
arXiv	1,005	713	0.71
Tobacco-Induced Diseases	9 55	373	0.39
Heythrop Journal	949	2,194	2.31
UN Encyclopedia of Sustainable Development	890	936	1.05
Encyclopedia of Indian Religions	770	71	0.09

Table 2 shows that the most published source of research trends on creative thinking skills in physics learning is the Journal of Physics Conference Series, namely 6,555 publications with 24,563 citations and an average citation of 3.75. Journal of Physics Conference Series contains scientific articles in the form of research results covering science, technology and teaching in the field of science. The first edition was published in 2022. All editions of this journal are open access, that is, articles published in them are permanently free to read, download, copy and distribute. Below are also presented ten (10) trending research article titles on creative thinking skills in physics learning which are often cited by other researchers in this regard.

Table 3. Top 10 Citations of Generic Science Skills Research Trends 2015-2024

Citation	Year	Author	Title
7	2022	S. Rahayu, P. Setyosari, A. Hidayat, D. Kuswandi	Effectiveness of Creative Problem Solving-Flipped Classroom to Improve Students' Creative Thinking Skills in Online Physics Education Learning
19.4	2019	Nanik Wijayati, Woro Sumarni, Sri Supanti	Improving students' creative thinking abilities through project-based learning
7.5	2020	M Satriawan, R Rosmiati, W Widia, F Sarnita, L Suswati, M Subhan, & F Fatimah	Contextual problem-based physics learning to improve students' creative thinking abilities in fluid material

6.6	2019	HR Dewi, T Mayasari, J Handhika	Improve creative thinking skills and understanding of physics concepts through the application of STEM-based inquiry
10	2020	R Rizal, D Rusdiana, W Setiawan and P Siahaan	Creative thinking skills of prospective physics teachers
18	2018	A Setiawan, A Malik, A Suhandi, & A Permanasari	The influence of higher-order thinking laboratories on increasing critical and creative thinking abilities
6.33	2021	RK Putri, N Bukit, MP Simanjuntak	The influence of the project-based learning model on critical thinking skills, creative thinking skills, collaboration skills, and communication skills (4C) in physics in high school
2	2021	M Asy'Ari, S Prayogi, B Mirawati	Development of inquiry-based physics learning tools to improve creative thinking abilities
1.33	2021	Ahmad Farhan; Nurlaili; Susana Soewarno; Yusrizal	Students' creative thinking skills and their influence on academic learning outcomes in Physics Laboratory II using a project-based learning model
5.14	2017	Nur Khoiri, Slamet Riyadi, Ummi Kaltsum, Nathan Hindarto and Ani Rusilawati	Teaches creative thinking skills with laboratory work

Table 3 shows that research on creative thinking skills in physics learning, which is widely cited by other researchers, is about "Improving students' creative thinking skills through project-based learning" namely at 19.04 (Nanik et al., 2019). Then the research entitled " The influence of high-level thinking laboratories on increasing critical and creative thinking abilities " was quoted at 18.00 (Setiawan et al., 2018). Research by Satriawan et al. (2020) entitled " Physics learning based contextual problems to enhance students' creative thinking skills in fluid topics " is also widely cited by other researchers, namely 7.5 per year. Rahayu et al., (2022) in their research entitled " The Effectiveness of Creative Problem Solving-Flipped Classroom for Enhancing Students' Creative Thinking Skills of Online Physics Educational Learning " is stated at 7 per year.

This research data is comparable to data on the trend of increasing research on creative thinking skills in physics learning from 2015 to 2024. This means that in that year, research related to creative thinking skills in physics learning was continuously cited by other researchers. In the articles researched and written by these researchers, there are many terms/keywords related to creativity. Below are presented ten (10) popular keywords related to generic creativity. Table 4 shows that the keyword that often appears related to research on creative thinking skills in physics learning is critical thinking, 635 times, with a level of 1.00. This shows that the ability to think creatively in physics learning is often researched together with the ability to master concepts, for example, research conducted by Dani et al. (2022), who researched the Application of Interactive Learning Media to Improve Students' Creative Thinking Skills. Table 4 also shows that Physics teacher is also a keyword that often appears in research trends on creative thinking skills in physics learning, namely 12 times with a relevance of 3.48. Development of a Project-Based E-Module to Improve Students' Creative Thinking Abilities on Acid-Base Material at MAN Katingan (Novi et al., 2024).

Table 4. Trend Keywords for creative thinking skills in Physics Learning Research 2015-2024

Provision	Incident	Relevance
Creative Thinking Skills	635	1.00
Physics teacher	12	3.48
achievement	16	3.47
Students' creative thinking skills	14	1.95
matter	17	1.17
Mathematical creative thinking skills	10	1.26
Prospective physics teacher	15	1.92
Pre-service physics teacher	12	4.19
Science learning	14	2.22
Validity	13	1.96

Below is a visualization carried out by creating a landscape map, which offers a visual representation of a subject related to scientific study. The results of bibliometric mapping of co-word networks in articles related to the topic of creative thinking skills in physics learning are presented in Figure 2.

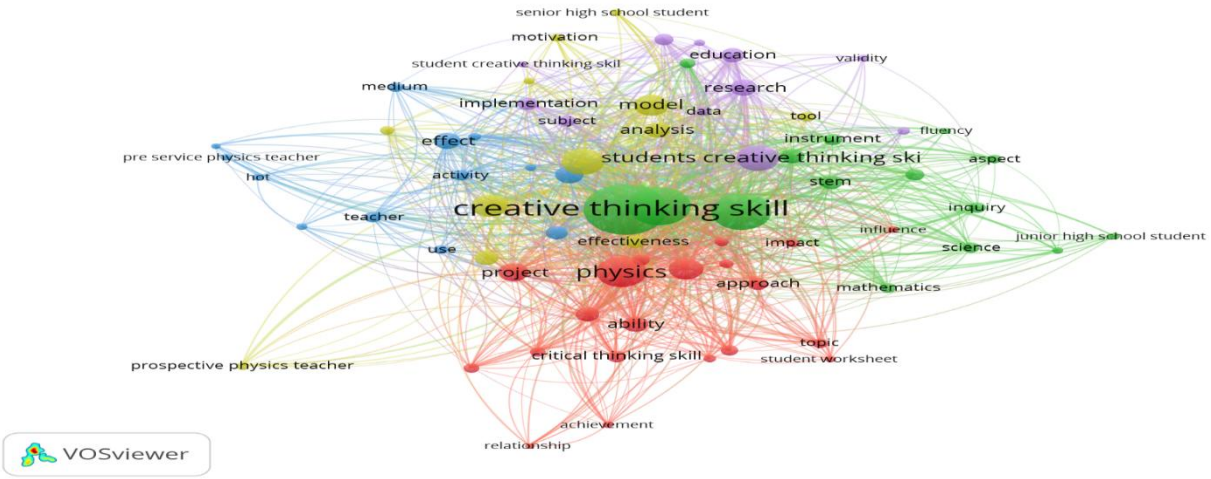

Figure 2. Network visualization of Generic Science Trends Physics Learning Research Skills

Figure 2 shows the results of bibliometric keyword mapping against research trends in generic science skills in physics learning. In Figure 2 there are 1945 terms and 71 keyword items that are often used in research on creative thinking skills in physics learning from 2015 to 2024. Figure 2 also contains 5 clusters, where the first cluster is red and consists of 15 keyword items, namely aspects, creative thinking skills, fluency, etc. The second cluster in green consists of 13 keyword items, namely analysis, mathematical creative thinking, etc. The third cluster in blue consists of 13 keyword items, namely application, creative thinking ability, etc. The fourth yellow cluster consists of 11 keyword items, namely activity, creative thinking skills, development, etc. The fifth purple cluster consists of 10 keyword items, namely model ability, achievement, creative thinking, etc.

Figure 2 above also shows that the n network visualization shows the network between the terms being visualized. Keywords are classified into five clusters which are arranged in a color chart showing the divisions/clusters that are connected to each other. The results of this analysis can be used to determine keyword research trends in the last year. This analysis shows several key words that are often used in research on creative thinking skills in physics learning. The more keywords that appear, the wider the visualization displayed. Below are also presented keywords regarding creative thinking skills in physics learning based on overlay visualization.

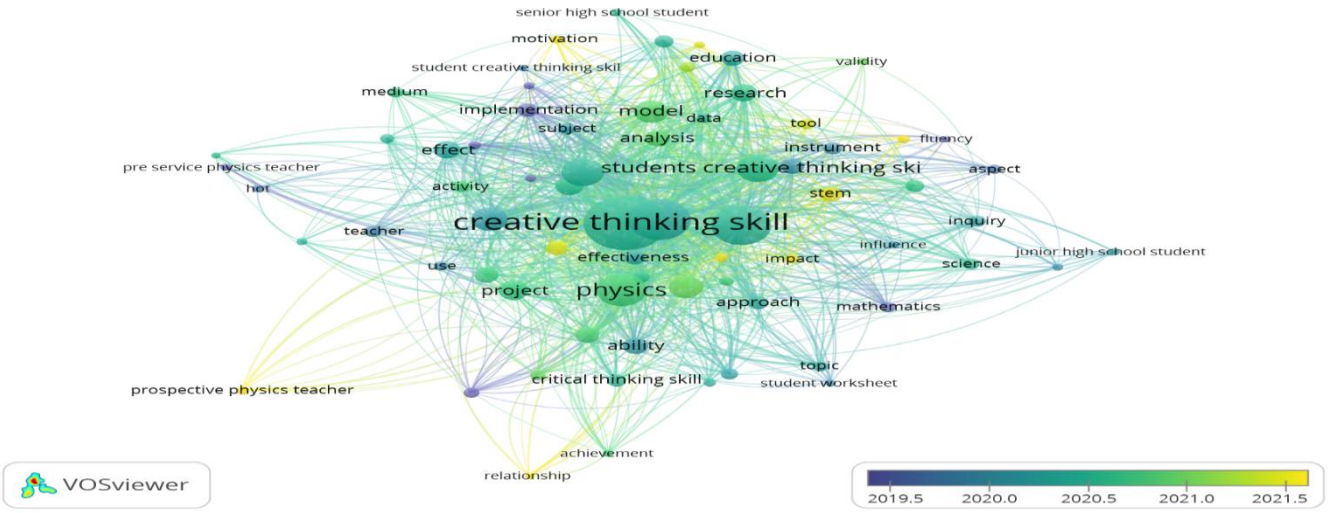

Figure 3. Overlay visualization of Generic Science Skill Trends in Physics Learning Research

Figure 3 shows the trend of keywords related to research on creative thinking skills in physics learning in Google Scholar-indexed journals from 2015 to 2024. The trend in the theme of writing articles related to creative thinking skills in physics learning from the oldest year to the newest year is marked with the themes purple, light purple, blue, dark green, light green, and yellow. In the picture above, you can see a virtual laboratory. This shows that these keywords were widely used by researchers in 2020. In 2021, the keywords that often appear are skills, projects, student creative thinking skills, analysis, models, etc.

Research on creative thinking skills in physics learning is one area of research that has developed rapidly in recent years. The following also presents keywords for creative thinking skills in physics learning research based on visualization science learning.

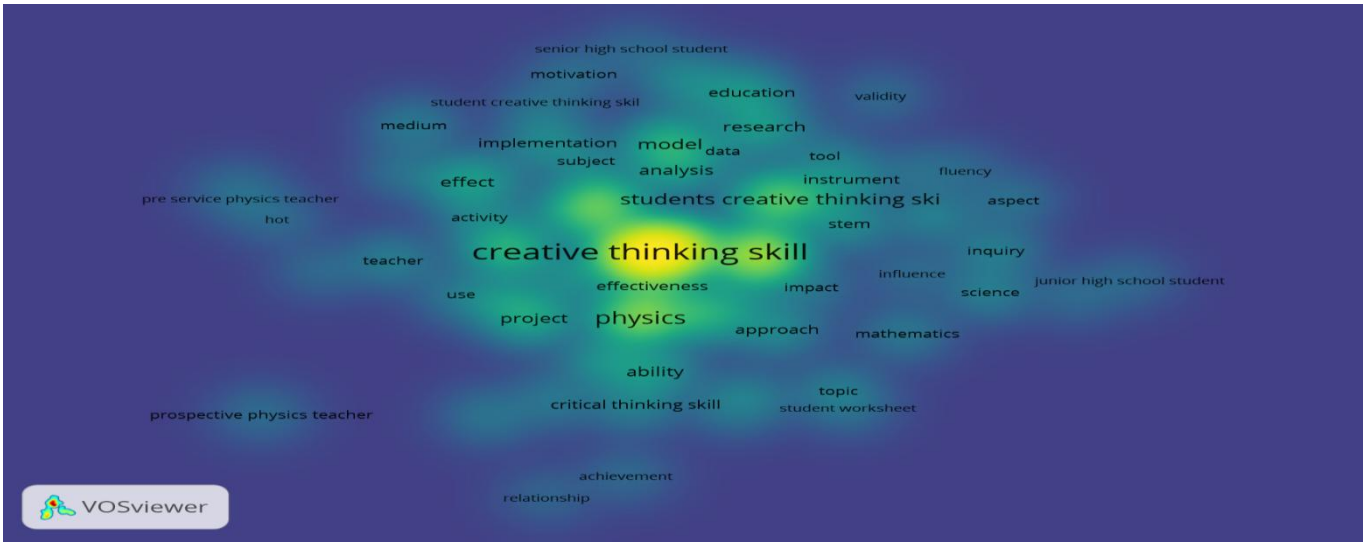

Figure 4. Density visualization of creative thinking skill trends in Physics Learning Research

Figure 4 shows a visualization of the density. The density of research themes is shown in bright yellow. The brighter the colors of a theme, the more research is involved. The fainter the color means the theme is rarely researched (Kaur et al., 2022; Liao et al., 2018). Vaguely colored themes such as hot, research, inquiry, achievement are vaguely colored keywords. This shows that these keywords can be used as a reference for further research. Doyan et al., (2023) and Bahtiar et al., (2023) stated that yellow indicates keywords that are currently and frequently used in research.

Overall, research on creative thinking skills in physics learning is important because it makes a significant contribution to 21st century education. Creative thinking is part of the 21st century skills students must have. Generic Science Skills are very important so that students are able to process information to solve problems both in learning and in real life. The research trend on creative thinking skills in physics learning is expected to continue to develop in the next few years. This can be done by developing new learning models, media or learning tools to facilitate students' creative thinking skills, especially in physics subjects.

CONCLUSSION

Research regarding trends in creative thinking skills in physics learning has high urgency because of its potential to provide various benefits for 21st century education. Research trends on creative thinking skills in physics learning indexed by Google Scholar from 2015 to 2024 have experienced a fluctuating increase. Research trends with an increase in the number of publications from 2015 to 2018. However, in 2019 and 2023, the research trend for generic science abilities in physics learning has decreased from the previous year. There are many documents in the form of articles, proceedings, book chapters and edited books that discuss research on creative thinking skills in physics learning. Key words that are often used in creative thinking research are creative thinking skills, physics teacher, PBL, science learning, etc.

ACKNOWLEDGMENT

The researcher expressed his thanks to the team so that the researcher could complete his research in the form of a journal publication.

REFERENCESS

Alhafizin, M., Supratman, S., Asri, M., & Shelvyandira, I. L. (2025). The Impact of Problem-Based Learning on The Biology Achievement of Grade XI Students at SMAN 1 Sikur, East Lombok. Indonesian Journal of Educational Innovation, 1(2), 37–41. Retrieved from https://journals.widhatulfaeha.id/index.php/jpkjl/article/view/62

Badmus, O. T., & Jita, L. C. (2024). Physics difficulty and problem-solving: Exploring the role of mathematics and mathematical symbols. Interdisciplinary Journal of Education Research, 6, 1-14. https://doi.org/10.38140/ijer-2024.vol6.08

Bahtiar, B., Yusuf, Y., Doyan, A., & Ibrahim, I. (2023). The Trend of Technology Pedagogical Content Knowledge (TPACK) Research in 2012-2022: Contribution to Science Learning of 21st Century. *Jurnal Penelitian Pendidikan IPA*, *9*(5), 39-47. 10.29303/jppipa.v9i5.3685

Beetlestone, F. 2011. Creative Children, Imaginative Teaching. Strategi Pembelajaran untuk Melesatkan Kreativitas Siswa diterjemahkan oleh Narulita Yusron. Bandung: Nusa Media

Dani, K. G., Saputro, E. F. H., & Lestari, N. (2022). Penerapan Media Pembelajaran Interaktif untuk Meningkatkan Keterampilan Berpikir Kreatif Siswa. *QUANTUM: Jurnal Pembelajaran IPA dan Aplikasinya*, *2*(2), 37-41.

Doyan, A., Susilawati, S., Hadisaputra, S., & Muliyadi, L. (2022). Effectiveness of quantum physics learning tools using blended learning models to improve critical thinking and generic science skills of students. *Jurnal Penelitian Pendidikan IPA*, *8*(2), 1030-1033.10.29303/jppipa.v8i2.1625

Good, M., Maries, A., & Singh, C. (2019). Impact of traditional or evidence-based active-engagement instruction on introductory female and male students' attitudes and approaches to physics problem solving. Physical Review Physics Education Research, 15(2), 020129. https://doi.org/10.1103/PhysRevPhysEducRes.15.020129

Hallinger, P., & Chatpinyakoop, C. (2019). Tinjauan Bibliometrik Penelitian Pendidikan Tinggi untuk Pembangunan Berkelanjutan, 1998–2018. *Keberlanjutan, 11* (8), 2401. https://doi.org/10.3390/su11082401

Hallinger, P., & Nguyen, V.-T. (2020). Memetakan Lanskap dan Struktur Penelitian Pendidikan untuk Pembangunan Berkelanjutan: Tinjauan Bibliometrik. *Keberlanjutan, 12* (5), 1947. https://doi.org/10.3390/su12051947

Hidayatullah, M. I., Udayani, N. W. A., & Hamdiana. (2025). A Project-Based Learning Model Design for Social Studies to Develop 21st-Century Skills in Primary School Students. Jurnal Literasi Pendidikan Indonesia, 1(1), 27–35. Retrieved from https://journals.widhatulfaeha.id/index.php/jper/article/view/87

Hiidayatullah, N., & Fatimah, Z. (2025). The Effectiveness of the Problem-Based Learning Model on the Critical Thinking Skills of Grade XI Students at MAN 1 Central Lombok. Indonesian Journal of Educational Innovation, 1(3), 21–27. https://doi.org/10.65622/ijei.v1i3.156

Hulwani, A. Z., Pujiastuti, H., & Rafianti, I. (2021). Pengembangan Media Pembelajaran Interaktif Android Matematika dengan Pendekatan STEM pada Materi Trigonometri. Jurnal Cendekia : Jurnal Pendidikan Matematika, 5(3), 2255–2269. https://doi.org/10.31004/cendekia. v5i3.717

Ishlahul'Adiilah, I., & Haryanti, Y. D. (2023). Pengaruh model problem based learning terhadap kemampuan berpikir kreatif siswa pada pembelajaran IPA. *Papanda Journal of Mathematics and Science Research*, *2*(1), 49-56. https://doi.org/10.56916/pjmsr.v2i1.306

Kwangmuang, P., Jarutkamolpong, S., Sangboonraung, W., & Daungtod, S. (2021). The development of learning innovation to enhance higher order thinking skills for students in Thailand junior high schools. Heliyon, 7(6). https://doi.org/10.1016/j.heliyon.2021.e07309

Munfaridah, N., Avraamidou, L., & Goedhart, M. (2021). The use of multiple representations in undergraduate physics education: what do we know and where do we go from here?. Eurasia Journal of Mathematics, Science and Technology Education, 17(1), em1934. https://doi.org/10.29333/ejmste/9577

Setiawan, A., Malik, A., Suhandi, A., & Permanasari, A. (2018, February). Effect of higher order thinking laboratory on the improvement of critical and creative thinking skills. In IOP Conference Series: Materials Science and Engineering (Vol. 306, No. 1, p. 012008). IOP Publishing. https://doi.org/10.1088/1757-899X/306/1/012008

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., ... & Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. Annals of internal medicine, 169(7), 467-473. https://doi.org/10.7326/M18-0850

Yan, L., & Zhiping, W. (2023). Mapping the literature on academic publishing: A bibliometric analysis on WOS. Sage Open, 13(1), 21582440231158562. https://doi.org/10.1177/21582440231158562