CER 1(1) (2025)

Current Educational Review

https://journals.balaipublikasi.id/cer

Flipbook-Based Science E-Modules with the CINQASE Model: A Literature Review on Critical Thinking and Learning Outcomes

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Received: January 23, 2025
Revised: March 19, 2025
Accepted: March 25, 2025
Published: March 31, 2025

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Abstract: This study aims to identify and analyze the development trends of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools. This research method is descriptive analytical. The data used in this study were obtained from documents indexed by Google Scholar from 2015-2024 using Publish or Perish and Dimension.ai. The research procedure uses the PRISMA guidelines. The data identified and analyzed are the types of publications, publication sources, and research titles on the development trends of flipbook-based science with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools. The data analysis method uses bibliometric analysis assisted by VOS viewer software. The results of the analysis show that the research trend on the development of flipbook-based science with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools indexed by Google Scholar from 2015 to 2024 has increased significantly in 2023. However, in 2024 there was a decrease in the research trend on this matter. There are 268 edited books and articles related to the discussion of flipbook-based science development research with the CINQASE learning model reviewed from the perspective of critical thinking skills to improve student learning outcomes in junior high schools. Keywords that are often used in research on this matter are e-module, student, problem, and skill.

Keywords: CINQASE Learning Model; Critical Thinking Skills; E-Module; Learning Outcomes

Introduction

Education is a fundamental aspect in developing quality human resources, especially in the era of the industrial revolution 4.0, where mastery of technology is one of the essential competencies for students (Indrajit & Djokopranoto, 2016). In today's digital era, the integration of technology in education has become a vital need, especially in facilitating more interactive and easily accessible learning for students. One of the increasingly popular technologies is flipbook-based e-modules, which offer a more dynamic learning experience than conventional printed modules (Sutrisno et al., 2020). Flipbooks allow students to interact with learning content through electronic devices, provide attractive visualizations and facilitate access to various additional learning resources (Fauzan & Yusuf, 2019).

Flipbook-based e-modules offer a more interactive and engaging approach compared to traditional printed modules. Flipbooks utilize animation, video, and interactivity that can make it easier for students to understand the material, so that they can support

How to Cite:
Rahmatin, J. A., Purwoko, A. A., & Makhrus, M. (2025). Flipbook-Based Science E-Modules with the CINQASE Model: A Literature Review on Critical Thinking and Learning Outcomes. *Current Educational Review*, *1*(1), 38–45. Retrieved from https://journals.balaipublikasi.id/index.php/cer/article/view/358

various student learning styles (Mayer, 2014). Previous studies have shown that the use of flipbook-based e-modules can increase learning motivation and conceptual understanding in science subjects (Purwanti, 2019). With an interactive design, students can be more actively involved in the learning process, which can ultimately improve their learning outcomes.

Apart from the technological aspect, the importance of learning models that support critical thinking skills cannot be ignored. In the context of science education, critical thinking skills are also a focus, considering that increasingly complex global challenges require individuals who can analyze problems in depth, find solutions, and make decisions based on data and facts (Ennis, 2015). Students' critical thinking skills are needed to solve problems and understand complex scientific concepts (Ramdani et al., 2021). One relevant learning model is the CINQASE (Collaborative in Questioning, Analyzing, Synthesizing, and Evaluating) learning model. This learning model is specifically designed to facilitate the improvement of students' critical thinking skills so that it is appropriate to be applied in this digital era learning (Hunaidah, 2022). This model has great potential to help students understand and master concepts, especially in science material. According to Hunaidah (2018), this model is also a development of two learning models, namely Collaborative Learning (CL) and Team Based Learning (TBL). CINQASE combines real contexts in learning, which is very suitable for science learning based on experiments and investigations, so that it can stimulate students' critical thinking skills (Dewey, 2016).

Critical thinking skills in junior high school students are essential skills to face the current digital era. Students with good critical thinking skills tend to have higher learning outcomes because they can process information better, understand concepts in depth, and solve problems with effective strategies (Facione, 2013). Therefore, integrating the CINQASE model in the use of flipbook-based e-modules has great potential to improve critical thinking skills and student learning outcomes in science subjects. A literature review conducted by Yusuf (2021) shows that the use of technology-based e-modules can significantly improve science learning outcomes at various levels of education. However, research on the effectiveness of flipbooks with learning models that support critical thinking skills such as CINQASE is still limited, especially at the junior high school level. In fact, at junior high school age, students are in an important phase in their cognitive development, where learning that stimulates critical thinking can have a long-term impact on learning outcomes.

Therefore, this study is important to be conducted in order to systematically see how the influence of flipbook-based e-modules combined with the CINQASE learning model on critical thinking skills and student learning outcomes in junior high schools. This study will focus on studies conducted from 2015 to 2024, to obtain a more comprehensive picture of the trends, strengths, and weaknesses of the use of this e-module in science education in junior high schools. With this systematic review, it is expected to provide practical recommendations for teachers and developers of educational modules in developing e-modules that are more effective and in accordance with the needs of today's junior high school students. This study is also expected to be the basis for further research related to the integration of technology and learning models that support the development of 21st century skills, such as critical thinking and collaboration (Trilling & Fadel, 2009).

Method

This research method is descriptive analytical, which aims to understand and describe research trends on Flipbook-Based Science E-Modules with CINQASE Learning Models Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools. The data used in this study were obtained from information sources indexed by Google Scholar using analysis tools such as Publish or Perish and Dimension.ai in the period 2015 to 2024. To conduct a search on Google Scholar, the keywords used are related to research trends on Flipbook-Based Science E-Modules with CINQASE Learning Models Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools such as "Flipbook", "Science", "E-Module", "Critical Thinking Skills", "Student Learning Outcomes".

In this analysis, as many as 1,000 documents related to research trends on Flipbook-Based Science E-Modules with CINQASE Learning Models Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools have been identified and analyzed. Google Scholar was chosen as the primary database due to its extensive coverage in displaying scientific publications in the fields of education and environment, as well as the application of consistent document selection standards (Hallinger & Chatpinyakoop, 2019; Zawacki-Richter et al., 2019). In addition, Google Scholar allows access to various forms of publications such as articles, proceedings, and preprints, which enrich the data of this study.

The analysis process was carried out using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to filter the data and ensure that the documents analyzed were in accordance with the research criteria. In addition, VOSviewer software

was used to visualize the relationship between the main keywords in the analyzed documents, so that it can provide an overview of the trend of Flipbook-Based Science E-Modules with the CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools.

Result and Discussion

This study aims to describe research trends that use Flipbook-Based Science E-Modules with the CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools in the period 2015 to 2024. Based on the trend analysis of publication data collected through Google Scholar from 2015 to 2024, research using Flipbook-Based Science E-Modules Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools has experienced a significant increase, especially from 2021 to 2023.

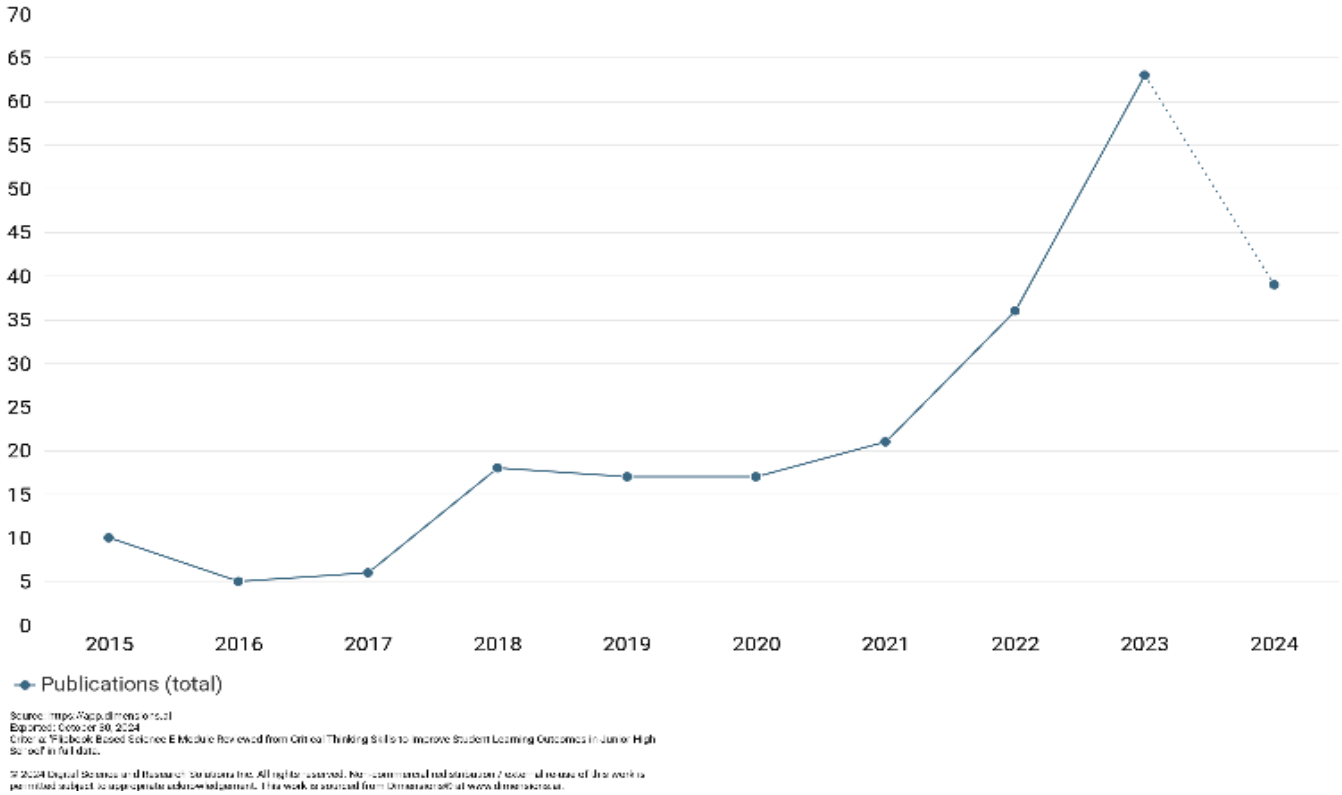

Figure 1. Research Trends on Flipbook-Based Science E-Modules Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools

Figure 1 shows that the research trend on flipbook-based science e-modules reviewed from critical thinking skills to improve student learning outcomes in junior high schools from 2015 to 2024 has increased and decreased. The decline in this research trend occurred in 2016, 2017, 2019, 2020, and 2024 so that it is necessary to conduct interesting research related to this topic. In 2015 there were 10 publications related to the development of flipbook-based science e-modules reviewed from critical thinking skills to improve student learning outcomes in junior high schools, then there was an increase in 2021 to 21 publications. The increasing research trend provides a deeper understanding of the problem of developing flipbook-based science e-modules reviewed from critical thinking skills to improve student learning outcomes in junior high schools and how to solve these problems.

Table 1. Trends in Flipbook-Based Science E-Modules Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools

Publications Type	Publications
Edites Book	138
Article	79
Monograph	43
etc.	8

Based on Table 1, it is known that flipbook-based science e-modules reviewed from critical thinking skills to improve student learning outcomes in junior high schools from 2015 to 2024 have more than 3 types of publications. In the form of books there are 138 documents, articles there are 79 documents and monographs as many as 43 documents, and other forms

of publications as many as 8 documents. Research trends in the development of flipbook-based science e-modules reviewed from critical thinking skills to improve student learning outcomes in junior high schools for the most types of publications compared to other types of publications, namely in the form of edited books. According to Haynes (2005), an edited book is a book that is edited and consists of a collection of chapters or essays written by various authors, under the coordination of one or more editors. The editor is tasked with collecting, selecting, editing, and combining various contributions from authors into one main theme or topic of the book. Edited books are made to provide various perspectives, collect research or information in one theme, and encourage the development of science, and facilitate scientific collaboration (Creswell, 2009).

Table 2. Top 10 Sources of Titles Trending in Flipbook-Based Science E-Modules with the CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Students' Learning Outcomes in Junior High Schools

Name	Publications	Citations	Cites/ year
Advances in Social Science, Education and Humanities Research	21	22	1.05
Jurnal Penelitian Pendidikan IPA	13	22	1.69
Lecture Notes in Computer Science	11	68	6.18
Lecture Notes in Networks and Systems	5	15	3.00
International Journal of Information and Education Technology	4	4	1.00
International Journal of Interactive Mobile Technologies (iJIM)	3	8	2.67
Journal of Education Technology	3	22	7.33
International Journal of Evaluation and Research in Education (IJERE)	2	8	4.00
Springer International Handbooks of Education	2	192	96.00
JPI (Jurnal Pendidikan Indonesia)	2	5	2.50

Table 2 shows that the most published research sources on the development trend of flipbook-based science e-modules with the CINQASE learning model reviewed from the critical thinking skills to improve student learning outcomes in junior high schools in Advances in Social Science, Education and Humanities Research as many as 21 publications with 22 citations and an average citation of 1.05. Advances in Social Science, Education and Humanities Research (ASSEHR) is a series of conference proceedings published by Atlantis Press. These proceedings include a variety of scientific papers from the fields of social sciences, education, humanities, and several other related sub-fields, presented at various international conferences. The topics discussed are very diverse, ranging from education, sociology, psychology, linguistics, economics, to issues related to public policy and community development. ASSEHR is often a place for publication of the latest research articles presented at conferences involving academics, practitioners, and researchers from various countries. For access, not all articles in ASSEHR are available for free, because many of them can only be accessed through purchase or subscription. However, most articles in Atlantis Press are freely accessible (open access) if supported by conferences that implement open access policies.

Table 3 presents the trend of Flipbook-Based Science E-Modules with the CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools which are often cited by other researchers in this regard.

Table 3. Top 10 Quotes on Flipbook-Based Science E-Modules Trends with CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools in 2015-2024

Mean	Year	Author	Title
41.00	2023	M Mohzana, A Rofi'i	The Development Of E-Module Based on Science Writing Heuristic (SWH) To Improve the Effectiveness of Teaching and Learning Activities
32.00	2022	F Hardiansyah	Improve science learning outcomes for elementary school students through the development of flipbook media
19.50	2022	CA Dewi, N Awaliyah, N Fitriana	Using Android-Based E-Module to Improve Students' Digital Literacy on Chemical Bonding.
18.50	2020	I Sriyanti, MR Almafie, L Marlina	The effect of using flipbook-based e-modules on student learning outcomes

Mean	Year	Author	Title
19.00	2022	NA Zakiyah, S Sudarmin	Development of e-module STEM integrated ethnoscience to increase 21st century skills
12.00	2021	RD Kurniati, D Andra, IW Distrik	E-module development based on PBL integrated STEM assisted by social media to improve critical thinking skill: A preliminary study
10.50	2022	YP Yani, H Hardeli, B Oktavia	The development of an integrated e-module of scientific literacy and video demonstration using a problem-based learning model for high school students on acids and …
8.33	2021	R Kurniawan	The validity of e-module based on guided inquiry integrated ethnoscience in high school physics learning to improve students' critical thinking
8.00	2020	NI Simatupang, E Sormin	The effectiveness of using flipbook maker to improve the chemistry learning outcomes of senior high school students
5.25	2020	R Linda, H Nufus, S Susilawati	The implementation of chemistry interactive e-module based on Kvisoft Flipbook Maker to improve student'self-learning

Table 3 shows that research on the development of Flipbook-Based Science E-Module with CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools, there are several that are cited by other researchers such as "The Development of E-Module Based on Science Writing Heuristic (SWH) To Improve the Effectiveness of Teaching and Learning Activities" which is 41.00. Then the study entitled "Improve science learning outcomes for elementary school students through the development of flipbook media" was cited 32.00 times. Furthermore, the study entitled "Using Android-Based E-Module to Improve Students' Digital Literacy on Chemical Bonding" was cited 19.50 times per year. This research data is comparable to the research trend data on the Development of Flipbook-Based Science E-Module with CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools in 2015-2024. This means that in that year research related to this topic was continuously cited by other researchers. In the articles researched and written by the researcher, there are many terms related to critical thinking skills and student learning outcomes.

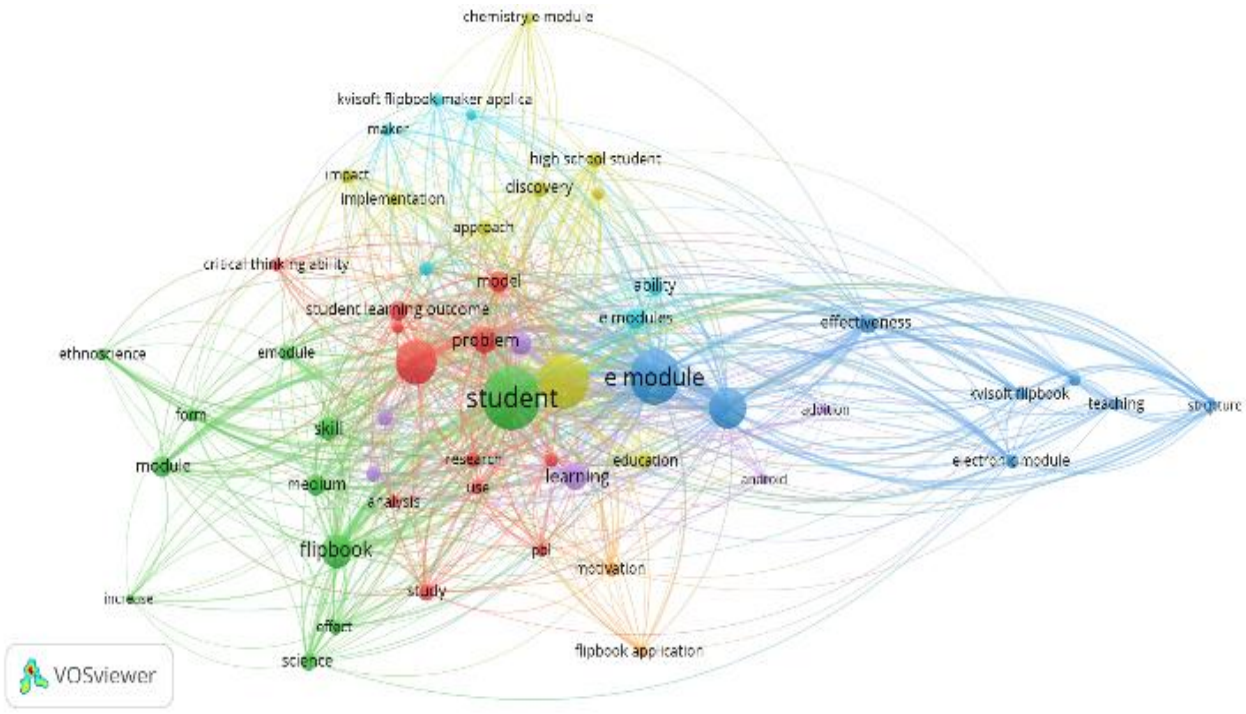

Figure 2. Network Visualization in the Flipbook-Based Science E-Module with the CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High Schools

Figure 2 also shows that the network visualization shows the network between the visualized terms. Keywords classified into three clusters are arranged in a color chart showing interconnected divisions. The results of this analysis can be used to determine research trends based on keywords in recent years (Martins et al.,

2024). This analysis shows several keywords that are often used in research on the development of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools. The more keywords that are visible, the wider the visualization displayed. The following are presented keywords regarding research on the development of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools in the form of overlay visualizations in Figure 3.

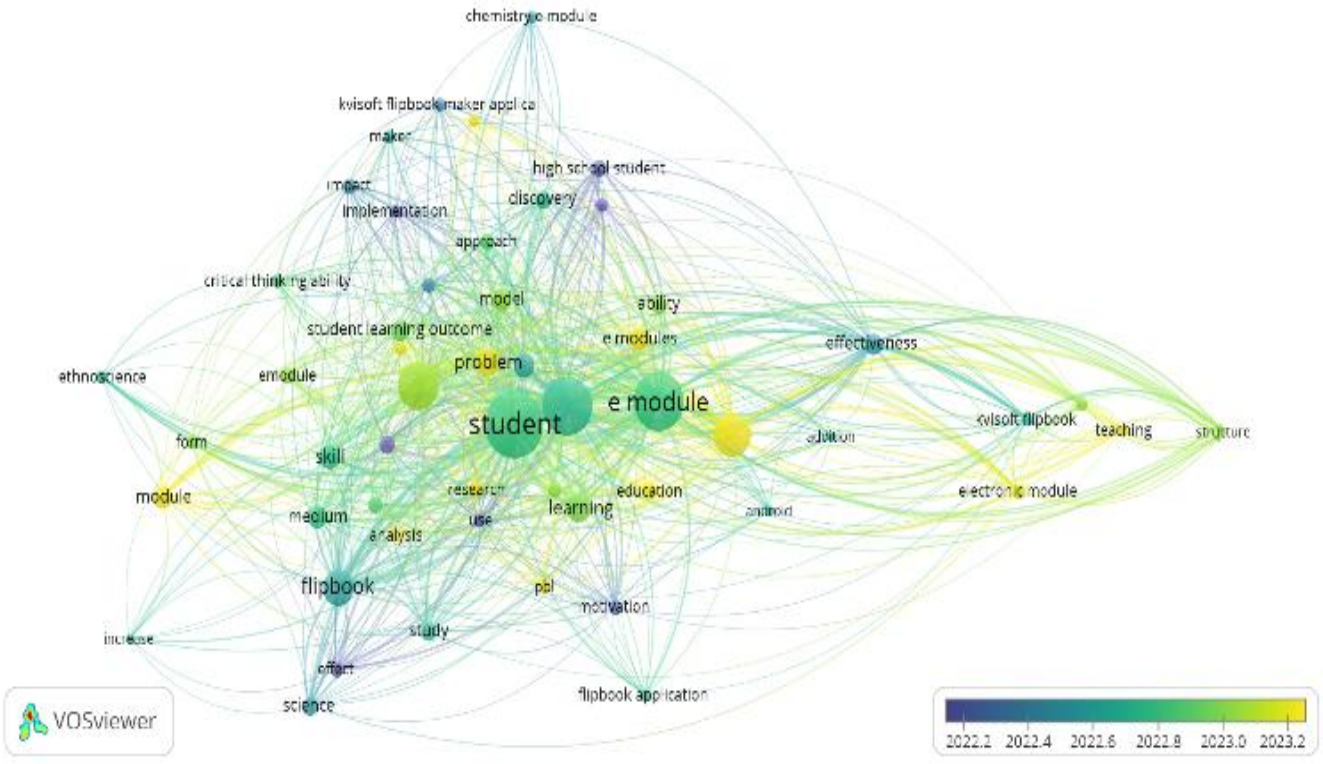

Figure 3. Overlay Visualization on Flipbook-Based Science E-Module with CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High School

Figure 3 shows the trend of keywords related to research on the development of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools in Google Scholar indexed journals from 2015 to 2024. The trend of article writing themes related to the development of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools from the oldest to the latest year is marked by the themes of purple, blue, turquoise, light green, and yellow. In 2022, the keywords that are widely used by researchers are e-modules, students, skills, and others. In 2023, the keywords that appear most often are teaching, education, analysis, and others.

Research on the development of flipbook-based science e-modules with the CINQASE learning model in terms of critical thinking skills to improve student learning outcomes in junior high schools is one of the research fields that has developed in recent years. The following are some keywords for the development of flipbook-based science e-modules with the CINQASE learning model reviewed from the perspective of critical thinking skills to improve student learning outcomes in junior high schools based on density visualization. Figure 4 shows the density visualization. The density of the research theme is indicated by bright yellow. The brighter the color of the theme, the more research has been done. Conversely, if the color is duller, it means that the theme is rarely studied (Gengörü & Öcalır., 2024; Salmani., 2024). Brightly colored themes such as e-modules, students, problems are among the research themes that are widely carried out by researchers. Conversely, such as models, student learning outcomes, flipbook applications and others are research themes that are rarely studied by researchers. This shows that these keywords can be used as references for further research.

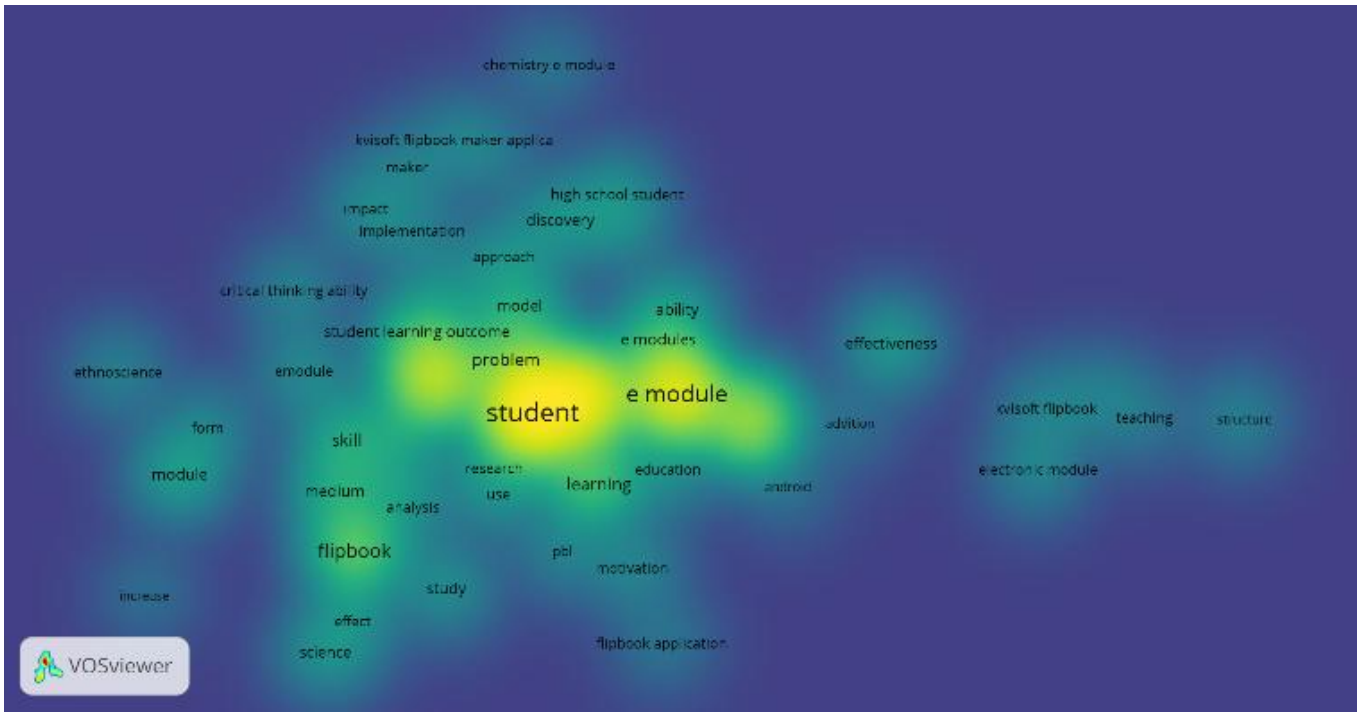

Figure 3. Density Visualization in Flipbook-Based Science E-Module with CINQASE Learning Model Reviewed from Critical Thinking Skills to Improve Student Learning Outcomes in Junior High School

Overall, the research on the development of a flipbook-based science e-module with the CINQASE learning model reviewed from the perspective of critical thinking skills to improve student learning outcomes in junior high schools is important to do because it can add digital learning resources that can be accessed by students anytime and anywhere. The use of the CINQASE learning model, which has been specifically designed to improve students' critical thinking skills, can also be used as an alternative learning model applied in the classroom. In addition, learning activities associated with digital learning can increase learning enthusiasm and are ultimately expected to improve student learning outcomes.

Conclusion

Research on the trend of developing e-module science based on flipbook with CINQASE learning model reviewed from critical thinking ability to improve student learning outcomes in junior high school has high urgency because it can be used as one of the easy and interesting digital learning resources to learn. The trend of research on the development of e-module science based on flipbook with CINQASE learning model reviewed from critical thinking ability to improve student learning outcomes in junior high school indexed by Google Scholar from 2015-2016 has decreased. Then from 2017 to 2023 it continued to increase when compared to 2015. However, the decline in the trend occurred again in 2024. There are 268 documents in the form of edited books, articles, monographs that discuss research on the development of e-module science based on flipbook with CINQASE learning model reviewed from critical thinking ability to improve student learning outcomes in junior high school. Keywords that are often used in this study such as e-module, student, problem, skill and others.

Acknowledgments
The researcher would like to thank the supervising lecturers and the lecturers in charge of the thesis proposal course for the Postgraduate Science Education Program at the University of Mataram who have guided and provided a forum to improve understanding in the field of education through research.

Author Contributions
All authors had significant contributions in completing this manuscript.

Funding
This research received no external funding

Conflicts of Interest
The author declares no conflict of interest.

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