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# CRITICAL THINKING SKILLS IN LEARNING PHYSICS: A BIBLIOMETRIC ANALYSIS USING VOSVIEWER

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## ABSTRAK

Kemampuan menyampaikan kritik atau saran merupakan hal penting yang harus dimiliki oleh siswa. Pembelajaran fisika merupakan salah satu yang dapat mengasah kemampuan berpikir kritis siswa. Critical Thinking Skills (CTS) telah menjadi salah satu tren penelitian dalam pembelajaran fisika. Penelitian ini akan difokuskan untuk membangun profil CTS pada pembelajaran fisika dalam lima tahun terakhir berdasarkan analisis bibliometrik menggunakan VOSViewer. Temuan menunjukkan bahwa ada beberapa parameter atau keterkaitan antara variabel yang menangkap tren CTS saat ini dan masa depan dalam pembelajaran fisika, seperti kemampuan kritis siswa, penelitian, pembelajaran fisika. Implikasi penelitian ini didukung dengan penelitian terkini, memberikan landasan empiris bagi pengembangan penelitian pendidikan, kemampuan berpikir kritis masih dapat menjadi trend penelitian terkini, digitalisasi pembelajaran fisika menjadi trend yang dapat dilakukan secara bertahap dan berkesinambungan.

**Kata Kunci:** Kemampuan Berpikir Kritis, Pembelajaran Fisika, Bibliometrik

### *ABSTRACT*

*The ability to express criticism or suggestions is an important thing that must be possessed by students. Physics learning is one that can hone students' ability to think critically. Critical Thinking Skills (CTS) has become one of the research trends in physics learning. This research will focus on building a CTS profile on physics learning in the last five years based on bibliometric analysis using VOSViewer. The findings show that there are several parameters or linkages between variables capturing current and future CTS trends in physics learning, such as students' critical abilities, research, physics learning. The implications of this research are supported by the latest research, providing an empirical basis for the development of educational research, critical thinking skills can still be a trend in recent research, digitizing physics learning is a trend that can be carried out in stages and continuously.*

***Keywords:*** *Critical Thinking Skills Learning, Physics Bibliometric*

## A. NTRODUCTION

Critical thinking in learning physics is very important because it can help students to understand physics concepts in depth, develop problem-solving skills, and apply knowledge of physics in everyday life situations is a form of critical thinking skills (Pendidikan & Indonesia, 2023)(Hashim et al., 2019). There are several aspects of critical thinking that can be applied in learning physics including conducting Analysis and Evaluation (Suhirman et al., 2020)]. Students need to be able to analyze the physics information provided, evaluate the reliability and correctness of data sources, and identify valid arguments. Students must also be able to look critically at physics theories, experiments, or research results, and question assumptions or conclusions that may be inconsistent. Aspects of problem solving in physics by using relevant physics principles and concepts (Permana & Kartika, 2021). Students need to be able to solve physics problems by identifying relevant information (Saepuloh et al., 2021), applying appropriate formulas or principles, and analyzing the results critically (Martawijaya et al., 2023)(Hikmawati et al., 2021) . Aspects of Understanding Concepts,: with students being able to associate these concepts with concrete examples, explain the relationships between different concepts, and recognize common misconceptions or reasoning (Abbas* et al., 2023). Critical thinking in learning physics involves analytical, logical, and reflective thinking skills (Suprapto et al., 2020)(Jaenudin et al., 2020). By developing critical thinking skills, students will become more effective learners(Kahar et al., 2021) and be able to overcome challenges in understanding physics and its application in everyday life (Martawijaya et al., 2023)(Putranta et al., 2021). CTS is a high-level thinking process that facilitates operational activities in internalizing information in analyzing and evaluating for success in solving life's problems (Adri et al., 2022)(Patonah et al., 2021)(Supratman et al., 2021)(Subekti & Prahmana, 2021). Recent research results[17] show that critical thinking skills are still one of the research trends in physics learning. Therefore research will be focused on producing CTS profiles in learning physics based on bibliometrics using VOSViewer(Hainora Hamzah et al., 2022). This research using bibliometrics was chosen because it is effective for viewing the latest description and profile of research trends in the future. The main implication of this research is to contribute to physics learning, especially the KBK profile in physicslearning (Jackson, 2006).

## B. METODOLOGI

The Bibliometric method is the main method of this research (Ferreira et al., 2021)(Ojeda-Pereira & Campos-Medina, 2021)(Jatmiko et al., 2021)(Dewantara et al., 2021)(Castaño et al., 2022) (Nuryadin et al., 2023). Google Scholar document data was collected on July 7 2023. The results of 93 documents with the keywords critical thinking in physics learning, then set the year with a focus on 2017 to 2022. The VOSViewer tool (Marín-Marín et al., 2021)(Sutiani et al., 2021) is used to support and find out CTS research trends in physics learning in the last five years.

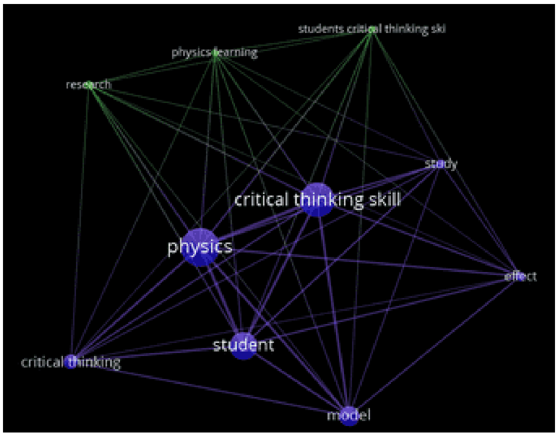


Figure 1. Visual Network of Critical Thingking Skill in Learning Physiscs in 2017-2022

Figure 1 shows the overall condition of CTS research oj Physics learning overlast five years. Researcers in the wordl produce physics clusters, critical thinking skills, students, models, critical thinking, effects, this study is colored purple, while those colored green are cluster research,physics learning students critical thingking skills result and discussion

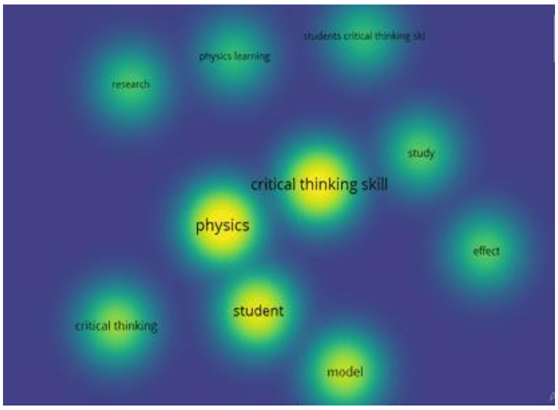


Figure 2: Visual Density of Critical Thinking Skills in Physics Learning in 2017-2022

Figure 2 shows a visualization of CTS density in physics learning in the last five years. Yellow domination is based on critical thinking skills, students, physics, models, critical thinking and effects. Based on this condition, the findings show that there are several parameters or interrelationships between variables to capture trends and novelty in the following figures 3, 4, 5.

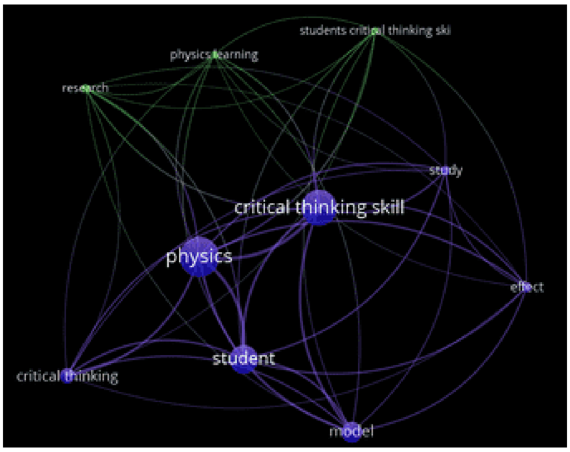
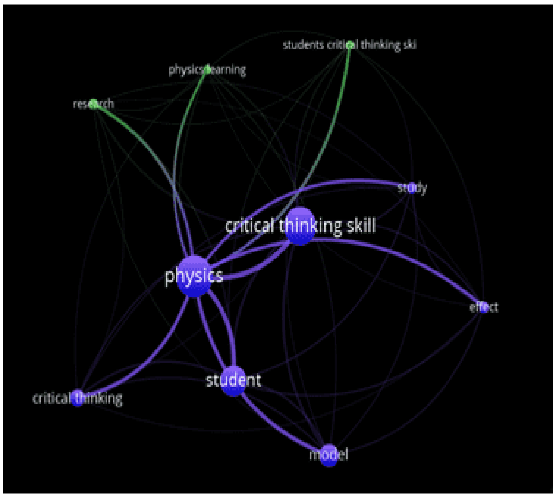
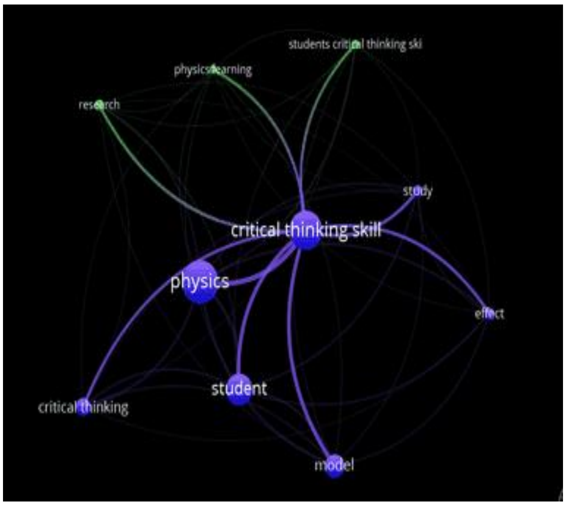


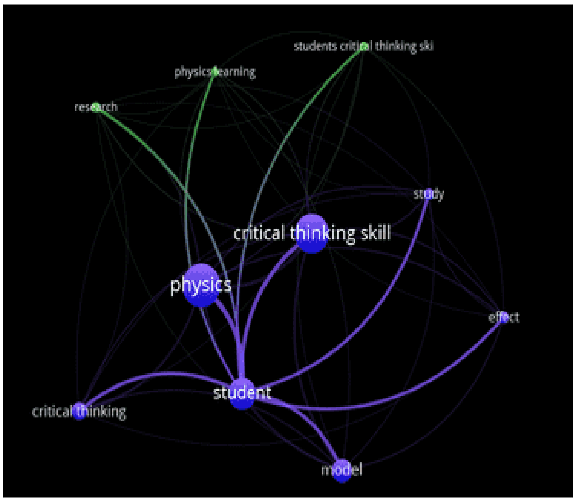
Figure 3: Trends in research methods for critical thinking skills in physics learning.

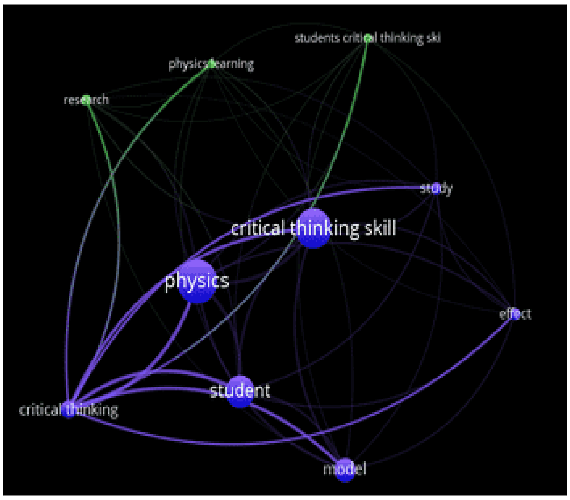
## C. RESULT AND DISCUSSION

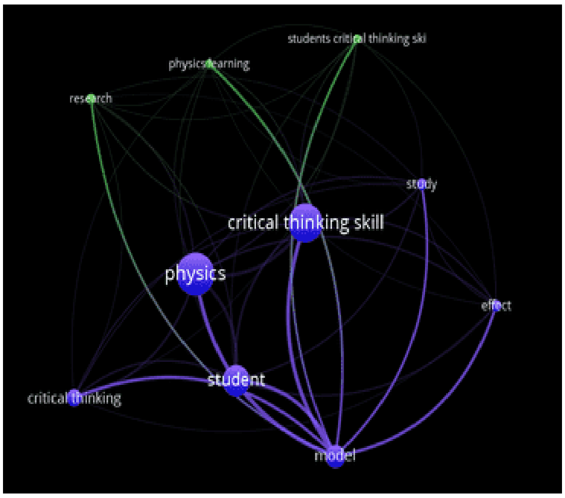
Figure 3 shows trends in research methods focused on research on critical thinking skills, physics, students, models, learning effects. These results can be used by other researchers in adapting the latest research to be carried out. For research trends related to the data collected can be seen in Figure 4

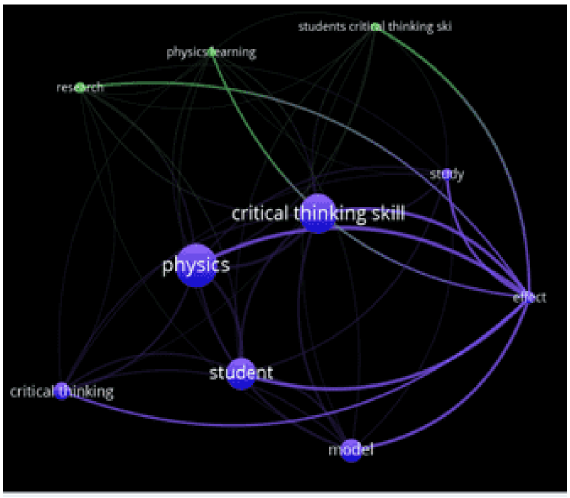












Trends in CTS data collection in physics learning in the last five years 2017-2022. Figure 4 shows the trend of data collection for physics learning CTS for the last five years 2017-2022 as in Physics, critical thinking skills, critical thinking, students, models, effects, study(Chen et al., 2021). (Hidayat et al., 2021) For research trends related to current and future CTS trends in physics learning can be seen in Figure 5

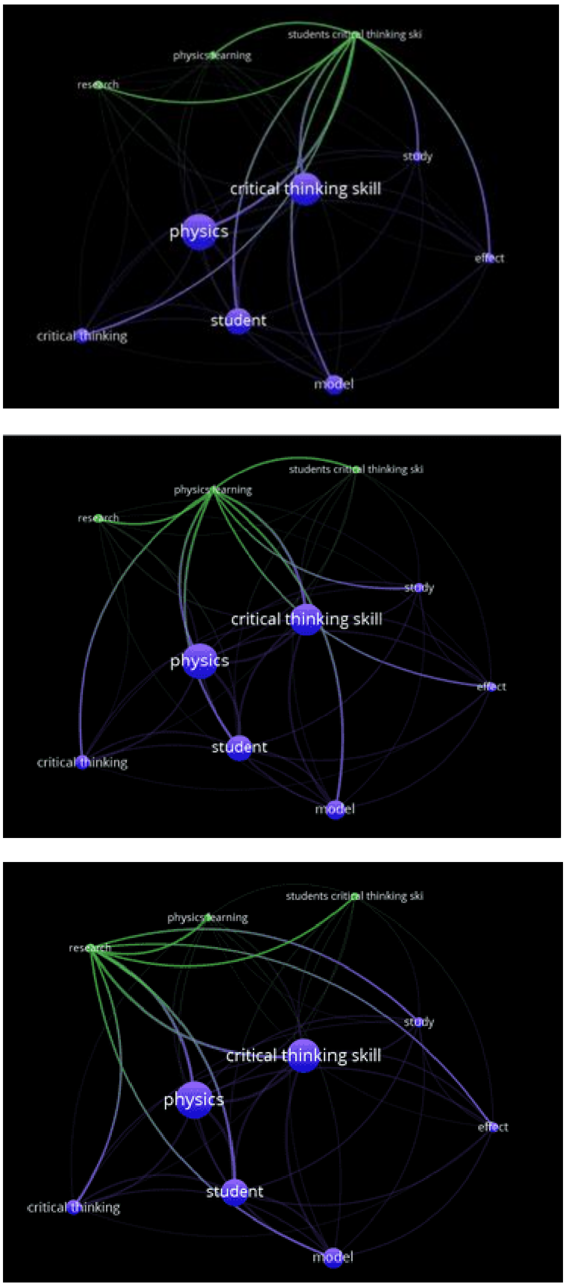


Figure 5. Trends Research Student Crititcal Thingking Skill, Physis Learning and Research

Figure 5 shows the existence of several parameters or interrelationships between variables to capture current and future CTS trends in physics learning. Such as Student critical thinking skills figure 5 (a), Physics Learning figure 5 (b), Research figure 5 (c) on physics learning. These findings become empirical to improve the quality of physics learning research, especially in practicing CTS, in physics learning CTS is still a research trend for the future, the use of digital technology to increase CTS in physics learning is a trend to be carried out in stages and continuously. (Jamaludin et al., 2022) (Mahfudz & Sukarno, 2023) (Puspita et al., 2023) Critical thinking and mastery of students' physics concepts. Further research is expected to be able to explore variables that can hone students' physics skills through inquiry-discovery learning.

## D. CONCLUSION

The findings show that there are several parameters or interrelationships between variables to capture CTS trends in current and future physics learning. Such as Physical learning, research, students' critical abilities. This research can be continued by subsequent research by increasing the amount of data by year and publisher such as Scopus, Web of Science (WoS) and others. Knowing research trends related to critical thinking in learning will provide opportunities for other researchers to adjust to learning other than physics learning.

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