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Prezi Mind Mapping Media in Physics Learning: A Bibliometric Analysis

Prezi Mind Mapping Media in Physics Learning: A Bibliometric Analysis

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Abstract. This study aims to determine the trend of the author's topics and keywords that are widely used related to Media Prezi Mind Mapping, to determine the contribution of Indonesian researchers in related research topics at an international scope, and to find out future research opportunities with associated topics mainly in physics learning. This research method is library research with descriptive analysis method through the bibliometric approach. The article's metadata was obtained from the search results of the Google Scholar database, which found 16.600 articles for 2016-2020 with the keyword 'Mind Mapping in Learning'. Meanwhile, based on the Scopus database, 7 Scopus indexed articles were obtained for 2014-2020 with the keyword 'Prezi Mind Mapping'. All metadata obtained is saved in *.csv* and *.ris* format for further visualization by *VOSviewer*. The results of data analysis show that trend fans and contributions Indonesian researchers still very little. It can pose a challenge for future research to prove how far the existence level of Prezi Mind Mapping is to continue to be developed. In addition, there are recommendations for collaboration on mind mapping research topics in learning with one of the related keywords, namely STAD (Student Team Achievement Division), hoping to produce a more efficient learning model, especially in physics, to be applied in future research.

1. Introduction

Rapid technological developments require educators to continue to innovate in learning, one of which is through learning media [1]. Learning media is anything that can be used to transmit messages from sender to receiver to stimulate students' thoughts, feelings, interests and attention in such a way that the learning process can occur [2]. The use of media in the teaching and learning process plays an important role, namely as a tool to create a fun and exciting process so that students can easily understand the material presented by the teacher [3]. Learning physics itself is very demanding of students to master the concept or basic knowledge. Therefore, the need for appropriate learning media to improve students' understanding of basic concepts. One of the efforts to achieve this is by applying a concept map as a learning medium.

A concept map is a schematic chart to describe a conceptual understanding in a series of statements. According to Biktimirov and Nilson [4], a concept map is a network that connects interrelated concepts and ideas that are interconnected with each other. Concept maps use the brain's ability for visual recognition to get the most out of a combination of colours, images, and symbols. Concept maps are more visually stimulating, so it will be easier to remember information [5]. An application that can be used as a learning medium in the form of a concept map is the Prezi application.

Prezi is a tool to develop various visuals, audio, and animations with engaging narrative formats. Presentations via Prezi are created on a canvas by visualizing ideas, highlighting details, and viewing the entire concept map, allowing the user to create a cinematic journey or concept map flow. The materials presented on the canvas can be pulled, shifted, rotated left and right to look attractive without the need to change slides. Prezi uses the Zooming User Interface (ZUI), which can show the menu in detail and give a deep impression on the message's recipient [6]. In addition, Prezi is an application based on Adobe Air, so videos and flash animations can be run more efficiently than when using PowerPoint.

This research on the Prezi Mind Mapping media has been carried out at the secondary to tertiary level of education. From the previous study results, the application of Prezi media in physics subjects has a significant effect on improving student learning outcomes in the cognitive, affective and psychomotor domains, marked by increased student learning outcomes [7]. However, this study only reveals the effect of using Prezi media on improving students' learning abilities and developing the media in learning. The average value of student learning outcomes after using Prezi media showed higher results than the intermediate student learning outcomes before using Prezi media [8].

The opportunity to use Prezi Mind Mapping learning media provides space for educators to optimize teaching and learning activities to improve students' understanding and learning abilities. One way that can be used is to integrate Prezi media into the learning. Prezi media was chosen based on the advantages and features of the zooming presentations as a medium to support learning that is interesting, interactive, and easily understood by students. Based on various previous studies, research on Prezi Mind Mapping media is in the form of knowing its effectiveness and development in learning. However, the survey of bibliometric literature review has not been discussed. The purpose of this study is to provide a bibliometric literature review to find recommendations for spare future trends related to Prezi Mind Mapping media in physics learning.

Finally, the research questions include:

a. How is the trend of research topics related to Media Prezi Mind Mapping during 2014-2020?
b. What are the most used author keywords in research topics related to Media Prezi Mind Mapping during 2014-2020?
c. How is the contribution of Indonesian researchers in research topics related to Media Prezi Mind Mapping in an international scope?
d. What are the future research opportunities with the topic of Media Prezi Mind Mapping in physics learning?

2. Method

The research method used is library research with descriptive analysis method through a bibliometric approach. The bibliometric analysis aims to measure the development of scientific article publications and scientific contributions [9-13]. The bibliometric study can look at the distribution of publications to evaluate the contribution of articles to the advancement of knowledge of various literature using a statistical approach and can provide a broader understanding of the entire discipline [14]. In this study, researchers focused on international journal publications, namely Scopus and Google Scholar. Google Scholar is considered an alternative that provides extensive scientific literature in the discipline and its sources [15].

The article metadata was obtained from the Scopus and Google Scholar database searches since March 2021, with keyword criteria adjusted to the research focus. Furthermore, the Google Scholar database obtained 16,600 articles for 2016-2020 with the keyword 'Mind Mapping in Learning'. Meanwhile, the Scopus database obtained 7 Scopus indexed articles for 2014-2020 with the keyword 'Prezi Mind Mapping'. Specifically for metadata from Google Scholar, only Top 40 papers were selected randomly but still based on their suitability for titles and keywords analyzed manually. All acquired metadata is saved in *csv* format (comma separated values) and *ris* (research information systems). The preparation of initial data statistics can be done especially on data from the Scopus

database, namely by grouping data through Microsoft Excel based on source, top author, country, institution, and top citation for *.csv* data format.

Furthermore, metadata mapping for the *.ris* format was carried out with the *VOSviewer* application. This application can produce output that provides three map visualizations: network, overlay, and density, both based on keywords and author. *VOSviewer* can work efficiently with large data sets and offer various exciting and visually apparent analyses through a comprehensive mapping visualization feature [16]. The Figure 1 is the flow of data collection and processing for bibliometric analysis.

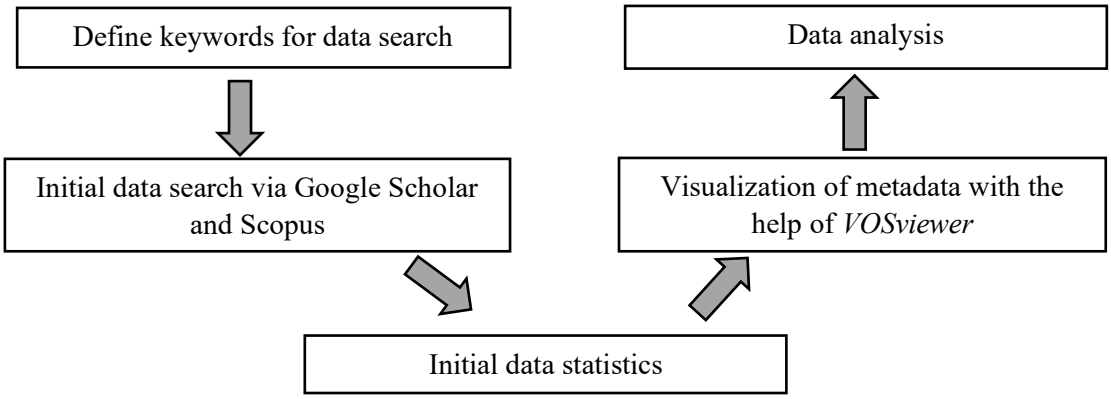


Figure 1. The flow of data retrieval and processing

The last stage is data analysis which refers to the *VOSviewer* mapping. Data analysis is done by looking at the visualization results both in-network, overlay, and density. In addition, it can also be seen based on the size of the nodes formed in the visualization results. Nodes with a large size indicate the dominant cluster on the research topic. On the other hand, tiny groups are shown by visualizing small nodes. This cluster shows the level of linkage between the results of the *VOSviewer* mapping and the research topic.

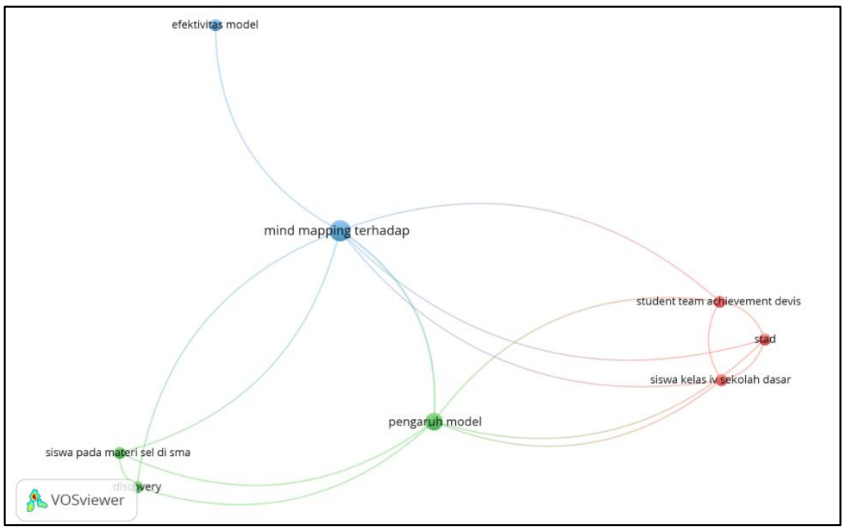


Figure 2. Network visualization the most used keyword for the Google Scholar database

3. Results and Discussion

Based on metadata search results on Google Scholar, 16,600 articles were obtained for 2016-2020 with the keyword 'Mind Mapping in Learning'. Meanwhile, based on the Scopus database, 7 Scopus indexed articles for 2014-2020 with the keyword 'Prezi Mind Mapping'. Metadata saved in *.csv* (Comma Separated Values) format and *.ris* (Research Information Systems) will then be prepared to

be visualized using *VOSviewer* software. First, based on the Google Scholar database, after 40 articles sourced from journals were randomly selected but still adjusted to the titles and keywords analysed, the mapping was obtained.

The visualization displays 40 articles that match the criteria, namely keywords, titles, and abstracts. Each term in the visualization image represents a keyword, title, or abstract related to the research. Based on the entered metadata, the first step of the metadata will be set to 1 author has 1 document resulting in 101 terms that will be selected to be readjusted with the research topic. After the first result is obtained, the data is re-limited to produce eight related terms or keywords, as shown in Figure 2. There are three different network visualization clusters, as shown in Figure 2. The first cluster (red) has three such as student team achievement division, STAD, and grade six elementary school students. The second cluster (green) has three phrases: students on cell material in high school, discovery, and model influence. While in the last group (blue), there are two relevant emergence terms, namely model effectiveness and mind mapping. The keywords in each cluster represent deep research entitled 'Mind Mapping in Learning', which was carried out for the last five years (2016-2020). In addition, with the visualization overlay display in Figure 3.

The yellow colour shows the latest research conducted in 2018, while the light green to purple colours represent research that has been carried out several years before. It can be identified that each existing cluster is connected by title and abstract. From the groups displayed, it can be detected that there are still few topics to discuss over the last five years to become opportunities for developing future research topics. A cluster with a large node form is a cluster with dominant keywords, while for a small node, it describes a minor group. This means that the topic of mind mapping in learning is related to the keyword mind mapping (the most dominant cluster is dark green) and the influence of the learning model (the dominant group is light green).

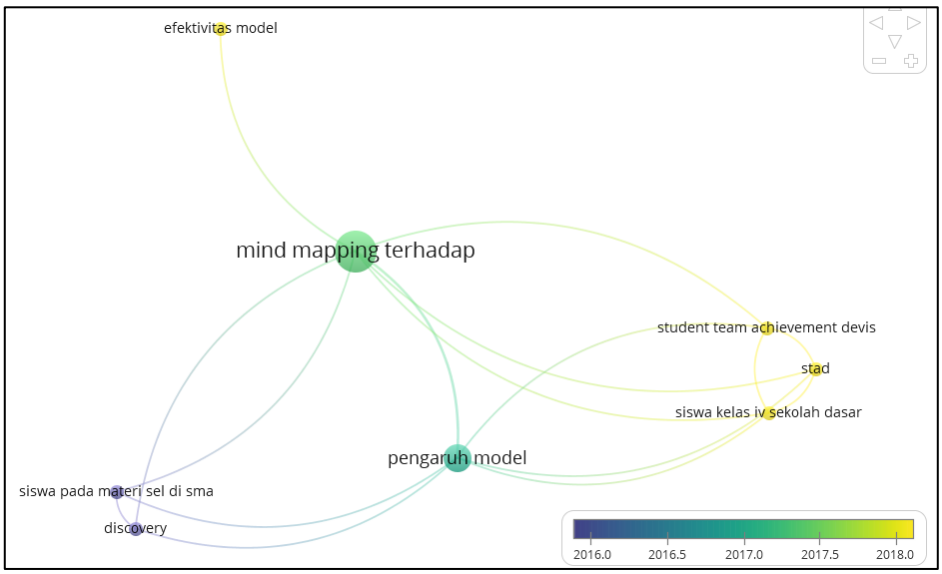


Figure 3. Overlay visualization of the most used keywords for the Google Scholar database

Based on the bibliometric analysis described by *VOSviewer*, the trend of research topics that have the opportunity to be carried out in the future is the keyword 'Student Team Achievement Division', which is in the little yellow cluster with small nodes. This keyword is connected to two other clusters: the light green cluster (the influence of the model) and the dark green cluster (mind mapping in learning). So based on these results, there are recommendations for mind mapping research topics in education that can collaborate with the 'Student Team Achievement Division (STAD) is a cooperative learning model that emphasizes student interactions and activities so that they can support each other in mastering lessons that have an impact on learning outcomes.

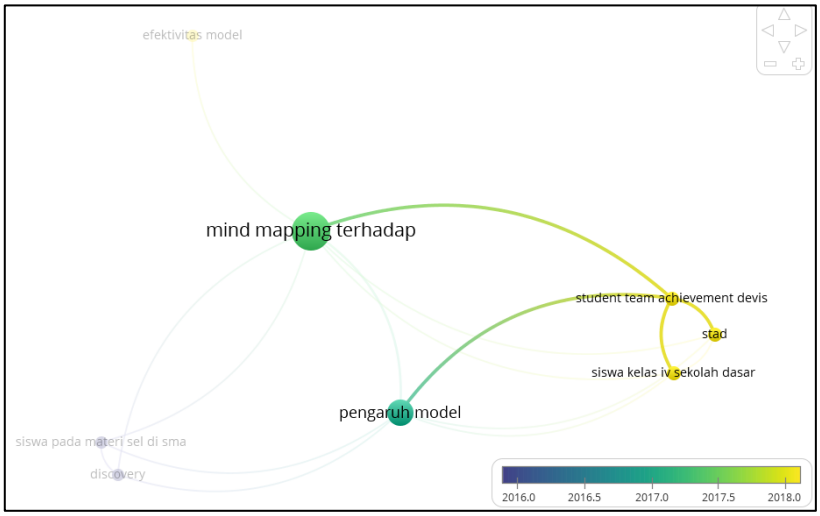


Figure 4. Opportunity for student team achievement division in further research

According to Slavin, STAD learning teaches students to work together on a common task and coordinate joint efforts to complete it [17]. If it has collaborated with Mind Mapping as a tool made by students to express their thoughts when interacting with each other, it is possible to produce an effective learning model to be applied.

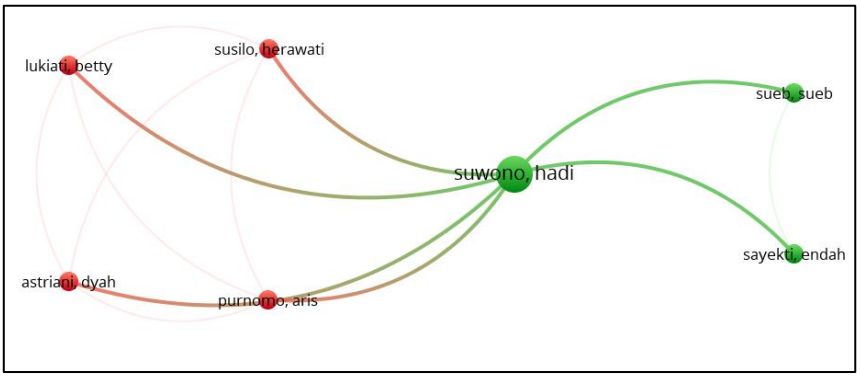


Figure 5. Top Author visualization for metadata based on google scholar database

Based on the 85 authors detected in the metadata for interconnected co-authorships, seven authors are connected, according to Figure 5, from the two resulting clusters, namely the red cluster consisting of four authors and the green group composed of three authors. It can be seen that Hadi Suwono is the top author with the dominant visualization display, namely the large green circle (centre) for the topic of mind mapping in learning based on the Google Scholar database.

As for the visualization of 85 authors without being limited by connections to each other, as shown in Figure 6. it can be seen that more clusters are generated. The visualization of Figures 5 and 6 indicates that the Hadi Suwono cluster from the State University of Malang is the top author for this research topic. He was then followed by another group of light blue, purple, dark green, etc.

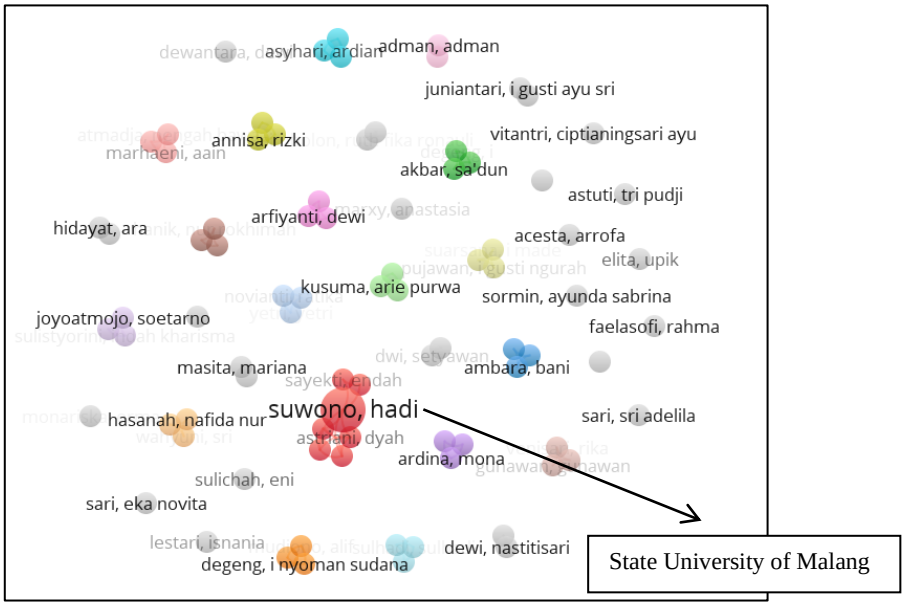


Figure 6. Overall author visualization for metadata based on Google Scholar database

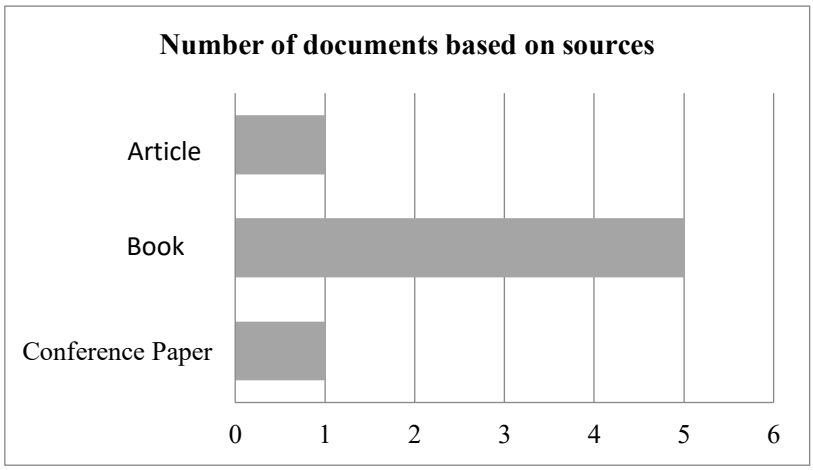


Figure 7. Number of documents by sources

Furthermore, Figure 7 is the result of grouping metadata with the help of Microsoft Excel for Scopus indexed documents for the all years category that has been saved in *.csv* form (Comma Separated Values). There are five documents sourced from books and one copy sourced from articles and conference papers each. This number is categorized as very low for searches with the Prezi Mind Mapping keyword. In other words, this topic has not become a trend of international interest. This can pose a challenge for future research to prove how far the existence level of Prezi Mind Mapping is to continue to be developed. On the other hand, the opportunity to create this research topic is still quite good, as evidenced by several other articles taken from several international journals showing exciting discussions. Some of these points can be seen in Table 1.

Table 1. Articles related to the topic of prezi mind mapping from several international journals

Research Background	Literature Review	Research Methods
	Lam [18]	
Common methods used to deliver didactic education were through PowerPoint; Prezi was used as an alternative. It has been described as innovative and dynamic, allowing for zooming in and out to focus on general and specific content.	Prezi is a cloud-based presentation editor that allows the user to create presentations that zoom. The goal is to make presentations more dynamic in nature and not as linear in structure.	A quantitative methodology was chosen comprising of a survey which examined themes of Prezi's effectiveness, and results were analysed via descriptive statistics.
Strasser [19]		Gabor [20]
Presentation software has centred around PowerPoint style editors for at least the last 20 years. While using PowerPoint in the classroom was considered to be cutting edge, it is now seen as the epitome of boring	Prezi is an internet-based presentation software that allows you to store your presentations in the cloud. There are many advantages to using this software, including the fact that it is cloud-based and that it is more exciting than the standard presentation software. Prezi is very visually-oriented and always enhances a presentation that is well-designed.	In this case the means could be compared with Independent Samples T-test, which showed up a difference between the means.
Gabor[20]	Rachman [21]	
Teachers need to use different presentation tools in the College to make presentations fun for students.	Prezi is an online presentation program that offers storage of presentation in the cloud. It is very different from PowerPoint in that its approach is non-linear. You are faced with a canvas instead of slides for creating your presentation. This means that you see the entire presentation at once instead of in discrete segments.	Particularly, qualitative research was the primary method in collecting the data. Meanwhile, the interview was held to gain more information about students' experiences in the using of Prezi in their learning activities.
Rachman [21]		Chou, Chang, and Lu [22]
The important role Information and Communication Technologies (ICT) play in education has been increasing recognized by educators of all levels. To help prepare future teachers who can make good use of ICT, teacher education institutions and programs are expected to not only “model the new pedagogies and tools for learning,” but also “develop strategies and plans to enhance the teaching-learning process”	Prezi, in particular, is a significant tool to present visual and verbal textual materials to the students to make the processes of teaching and learning more effective and retainable (Anderson, 2013).	A quasi experimental pre- and post-test control group design was adopted to fulfil the research purpose. Results were analysed via descriptive statistics.

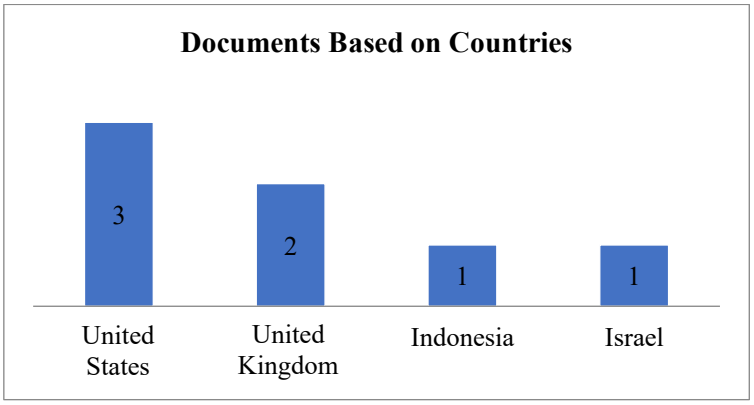


Figure 8. Number of documents by country

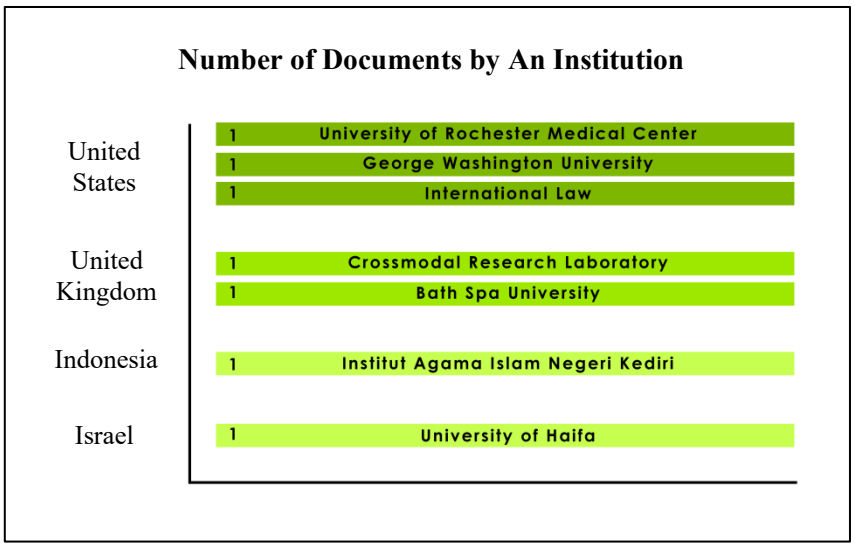


Figure 9. Number of documents by an institution

In addition, the countries with the highest number of contributors to articles in this research topic are the United States with three documents, followed by the UK with a total of two papers, and Indonesia and Israel with one piece each. Based on the institution for the United States, it consists of the University of Rochester Medical Centre, George Washington University, and International Law. For the UK, it consists of the Cross-modal Research Laboratory and Bath Spa University. For Indonesia, it is the Kediri State Islamic Institute, and for Israel, it is the University of Halfa. In this case, it can be seen that the contribution of Indonesian researchers is still very lacking in the research topic of Prezi Mind Mapping. That way, the opportunity to develop this topic is still vast for Indonesian researchers at the international level.

Based on Figure 10 which shows the top citations from the seven Scopus indexed documents, it can be seen that the most sources are Spence, Piqueras-Fiszman, with 166 authorities originating from George Washington University, United States of America. After that, in second place was Kober with a not so much difference, namely 143 from the Cross-modal Research Laboratory, England. Suppose it is reviewed in Figure 10 the names of Indonesian researchers still have a small number of citations for this research topic, namely only two for Yasin, Huda, Komarudin, Suherman, Septiana, Palupi. This again shows that there is still very little of the contribution of Indonesian researchers in this research topic.

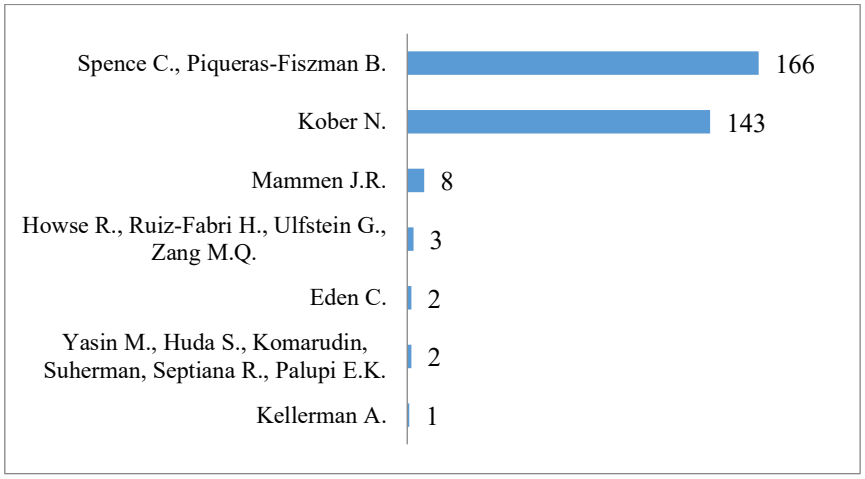


Figure 10. Top authors' citations

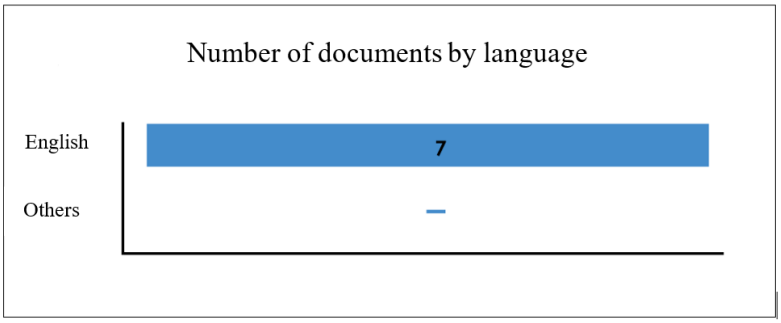


Figure 11. Number of documents by language

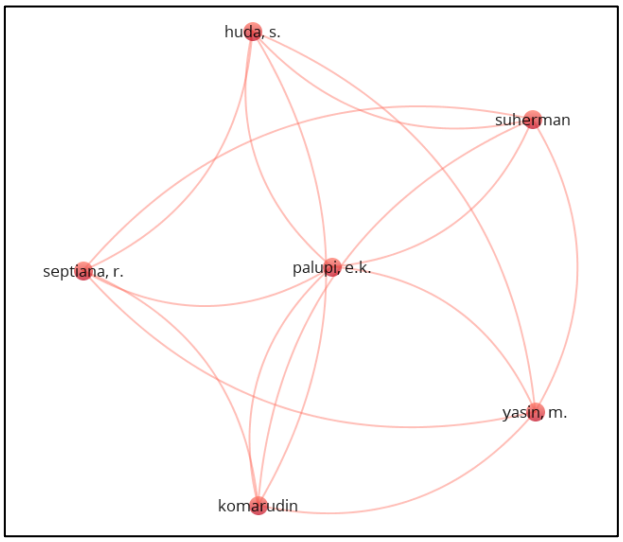


Figure 12. Network visualization for interconnected authorship

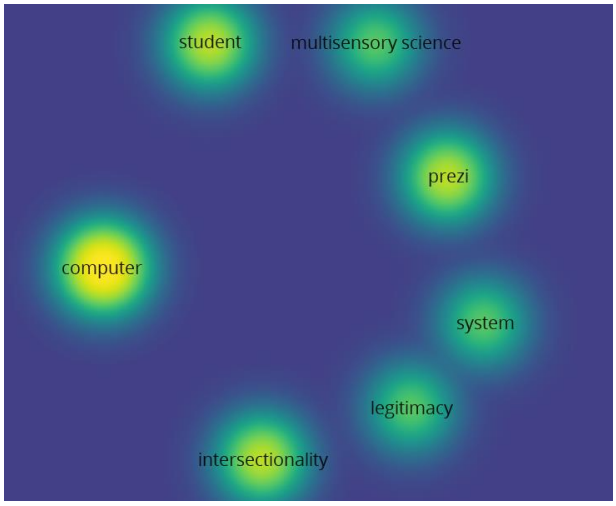


Figure 13. Density visualization of the most used keywords overall for the scopus database

Figure 12 on network visualization for connected authorships shows several names of authors from Indonesia. As for other authorships, it can be seen in Figure 15. Furthermore, based on the results density visualization above, it can be seen that the most used keywords in the last five years for seven clusters are computer, Prezi, student, and intersectionality as the dominant cluster. Therefore, this data shows that the topic of this research still has a slight research trend.

Network visualization shows the authorship group related topics as many as seven clusters. The red cluster is the dominant cluster, then the green, blue, and so on sets. Other than that, based on the results density visualization above, the development of authorship research can be seen every year. Data related to research on Prezi Mind Mapping in the last five years, both authorship in Figure 15 and related keywords in Figure 14, shows that again there are still very few results. The concept of mind mapping in education has been known for a long time. This is a research opportunity regarding the application of mind mapping, especially in the use of Prezi media, given that the application of Prezi Mind Mapping media in previous studies has proven to improve critical thinking skills, improve understanding of concepts, as well as to improve the achievement of competence in learning outcomes quite well. In particular, in physics, according to research from Rodhi [23], the use of Prezi-based learning media can improve critical thinking skills on heat material. Other than that, the Prezi Mind Mapping media development can improve understanding of the physics concept of optical instrument material and can improve student learning outcomes in the cognitive, affective, psychomotor domains [7, 24]. Thus, the use of Prezi Mind Mapping media in Physics learning can become a research topic in the future to further test its effectiveness.

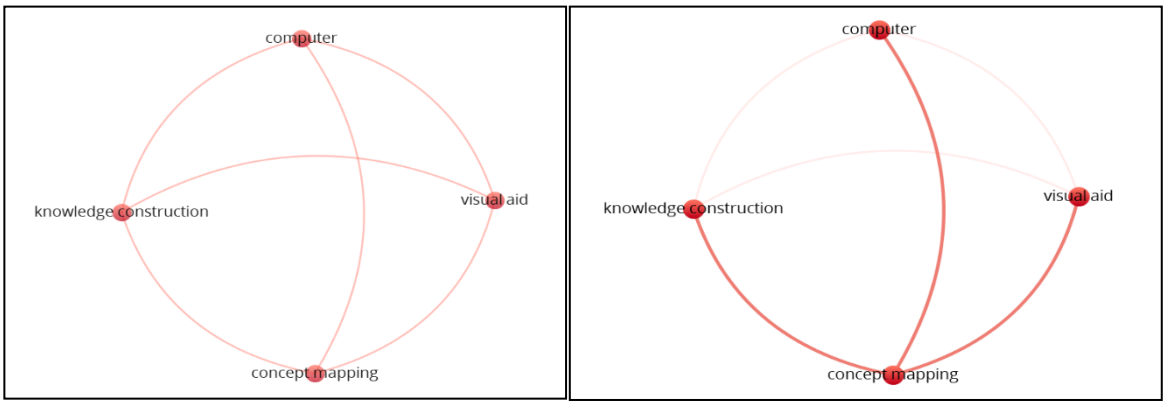
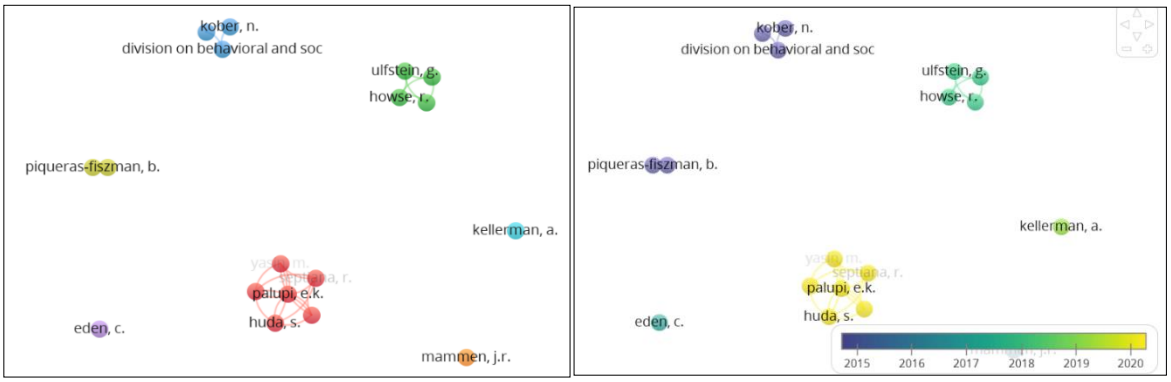


Figure 14. Network visualization of related keywords



(a) (b)

Figure 15. (a) Network visualization for authorship (b) Overlay visualization for authorship

4. Conclusion

Research topics related to Prezi Mind Mapping media in learning have a relatively small trend of enthusiasts based on the Google Scholar database, even very few based on the Scopus database. It can pose challenges for future research to prove how far the existence level of Prezi Mind Mapping is to continue to be developed. This research topic uses several dominant keywords, including computer, knowledge instruction, visual aid, concept mapping, influence model, and STAD. Based on this, the researcher recommends the collaboration of mind mapping research topics in learning with one of the keywords: STAD, in future research. STAD is a cooperative learning model that emphasizes student interactions and activities to support each other in mastery. If collaborated, then Mind Mapping media can act as a tool made by students to express their thoughts when interacting with each other more effectively. It is possible to produce a more efficient learning model to be applied. Other than that, the contribution of Indonesian researchers in this research topic in the international scope is still very lacking where the dominance is still in the United States and the UK, so this is a challenge and opportunity to develop the research topic of Prezi Mind Mapping Media in the future, especially in physics learning.

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