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HOT TOPICS IN ANXIETY MATHEMATICS: A BIBLIOMETRIC ANALYSIS FROM 2017-2022

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ABSTRACT

Covid-19 is an infectious disease field that is the main focus of life for the community, both from health, social, economic and education. With an increase in Covid-19 cases that affect student anxiety in learning mathematics. The research method used is by using bibliometric analysis. The results of this study explain that the publication of mathematics anxiety articles in 2021 is due to the rampant Covid-19 pandemic. This study aims to provide data on the number of publications, journals about the most prolific authors and writers from the Indonesian state using the keyword math anxiety that can be used for future studies. The data generated through Harzing's Publish or Perish obtained 1000 metadata where the data has a rapid development in 2021. VOSViewer shows that the topics are mathematics.

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1. Introduction

Covid-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). The increase in Covid-19 cases took place very quickly in various countries in a short time. So it can be categorized as a pandemic (WHO, 2020). The Covid-19 pandemic has caused many aspects of life to decline. A pandemic is a global disease outbreak that has resulted in a very significant decline in all aspects of life, from the political, defense and security, economic, social, cultural and educational aspects (Hasanah & Hamdan, 2021).

In every life, humans are required to process both physical and non-physical. In the process, humans need formal and non-formal procedures and learning so that life goes according to the existing social order. Learning that includes physical and non-physical is school. School is a reflection of education in Indonesia. One of the activities in school is learning. In essence, learning will shape the learning process and produce knowledge. The learning process is the linking of various elements that have a relationship to get a maximum result according to the planned goals (Pane & Darwis Dasopang, 2017).

Teaching and learning activities are a learning process that will occur because of the interaction between a teacher and his environment. Therefore, learning can

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happen anytime and anywhere (Raibowo et al., 2019). One of the learning activities at school is learning mathematics. Full mathematics learning requires understanding and mastery of the material to be studied (Kusumawardani et al., 2018). However, not a few students do not like mathematics because it is considered a difficult subject to understand (Disai et al., 2018). Besides being considered difficult, there are other factors that affect the understanding of mathematics. One of these factors is math anxiety (Setiawan et al., 2020). Jolejole-Caube et al. (2019) said that mathematics anxiety is the response of students experiencing feelings of tension, anxiety and fear so that it interferes with concentration in doing math problems and chooses to be alone without understanding math problems.

Bibliometrics is an analysis that is part of the evaluation in research. Various literatures that have been done previously explain that bibliometric analysis can be carried out with its own method in an effort to determine further research (Ellegaard & Wallin, 2015). Therefore, the purpose of this study is to find out Hot topics in Anxiety Mathematics: a bibliometric analysis from 2017-2022. This research will also enable other researchers to identify key or hot topics to study and to explore updated insights into specific research areas (Liwei Ma, 2020). In the world of research, VosViewer can analyze bibliometrics, find reference sources, research topics and have opportunities as a first step in research (Nurul & Winoto, 2022).

Based on the general description of Anxiety Mathematics, the researcher aims to study how the development of Anxiety Mathematics through bibliometrics in Google Schoolar indexed articles. From the formulation of the problem, the researcher hopes to see the developments that occur in Anxiety Mathematics.

2. Methodology

In this study, the researcher used a bibliometric approach. Bibliometrics is a method used in evaluating a research process. Based on the previous literature, it is explained that this method can be done independently without combining it with other methods (Ellegaard & Wallin, 2015). In this study, the method used was bibliometric analysis obtained from the Harzing's Publish or Perish database.

Research on mathematics anxiety in the pandemic era was carried out by bibliometric analysis, observing the development of scientific production on the subject. For this purpose, a database was created with the results obtained by performing a search on Harzing's Publish or Perish, Meta data obtained through Google Scholar from 2017-2022 with the title Hot topics in Anxiety Mathematics: a bibliometric analysis from 2017-2022. To achieve the goal that the researcher wants, the researcher uses the application (1) Microsoft Excel, (2) Harzing's Publish or Perish and (3) VOSViewer.

The principle in making bibliometrics is First, a reference source with the keyword Mathematics Anxiety. In addition to the title and keywords, the researcher also considers the year of publication that the researcher determines from 2017 to the last year of 2022. Second, searches for articles obtained from the Google Scholar database with Publish or Perish, which is limited to 1000 articles with the year from 2017 to the last year. 2022. Third, save the Publish or Perish article data in RIS file and csv file formats, csv files are used to process data via excel while ris files are for

VOSviewer. In searching for the database, you can use Publish or Perish and visualize it with VOSviewer (Haniyah & Joko Soebagyo, 2021). So that VOSViewer can collect and compile articles, create publication maps, and be able to group trends in articles (Ajinegara & Soebagyo, 2022).

3. Results and Discussion

Result

Obtained 1000 metadata of research articles with the keyword "mathematics anxiety" found on Google Scholar from 2017-2022. Based on this search, it shows that research on "mathematics anxiety" will experience a high increase in 2021. This is supported by (Stuart, 2012) states that the factor that causes the high number of anxiety is the weight of the burden being faced by an individual. The burden in this situation is due to the COVID-19 pandemic and is supported by (Dinata et al., 2021) which states that the pandemic situation is prone to anxiety that affects the mental health of students at the higher education level due to the COVID-19 pandemic situation(Dinata et al., 2021) which can be seen in Figure 1.

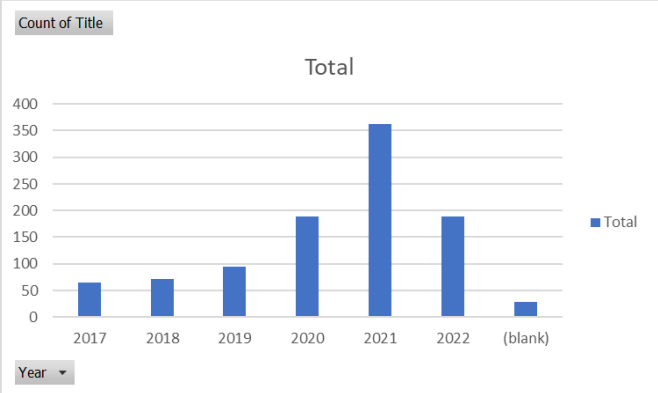

Figure 1. Increase in the number of publications by year

Based on the Figure 1, it is explained that every year there is an increase that discusses mathematics anxiety. Thus, in 2017-2022 it can be used as a reference for looking for meta data by waiting for Publish or Perish. There are several publishers which publish articles on mathematics anxiety, but the top five publishers are selected. The first publisher with articles related to mathematics anxiety is liebertpub.com with a total of 362 published articles.

Table 1. Publisher with the most published articles

No	Publisher	Total
1	liebertpub.com	885
2	Elsevier	784
3	books.google.com	240
4	Wiley Online Library	216
5	Springer	198

All articles that have been published in various journals and indexed by Google Scholar have various citation counts, there are articles that have more than eight hundred citations. Table 2 shows several articles related to mathematics anviety with the highest number of citations above five hundred.

Table 2. Articles with the most citations

Cites	Authors	Title	Year
885	X Zhou, CL Snoswell, LE Harding…	The role of telehealth in reducing the mental health burden from COVID-19	2020
784	J Koivisto, J Hamari	The rise of motivational information systems: A review of gamification research	2019
496	MA Edwards, S Roy	Academic research in the 21st century: Maintaining scientific integrity in a climate of perverse incentives and hypercompetition	2017
369	L Heise, ME Greene, N Opper, M Stavropoulou…	Gender inequality and restrictive gender norms: framing the challenges to health	2019
310	SP Jun, HS Yoo, S Choi	Ten years of research change using Google Trends: From the perspective of big data utilizations and applications	2018
269	A Suh, J Prophet	The state of immersive technology research: A literature analysis	2018
240	M Alvesson, Y Gabriel, R Paulsen	Return to meaning: A social science with something to say	2017
222	A Arora, S Belenzon, A Patacconi	The decline of science in corporate R&D	2018
216	M Haghani, MCJ Bliemer, F Goerlandt, J Li	The scientific literature on Coronaviruses, COVID-19 and its associated safety-related research dimensions: A scientometric analysis and scoping review	2020
204	DM Berry, A Fagerjord	Digital humanities: Knowledge and critique in a digital age	2017

The authors of articles related to mathematics anviety Publish or Perish Metadata is stored in RIS type for analysis in VOSViewer using the full counting method. The maximum number of researchers for each article is 25 and the minimum number of articles from each researcher is 5. As a result, 2311 researchers were detected and there were only 16 researchers who met the criteria. The sixteen researchers are presented in Figure 2 below:

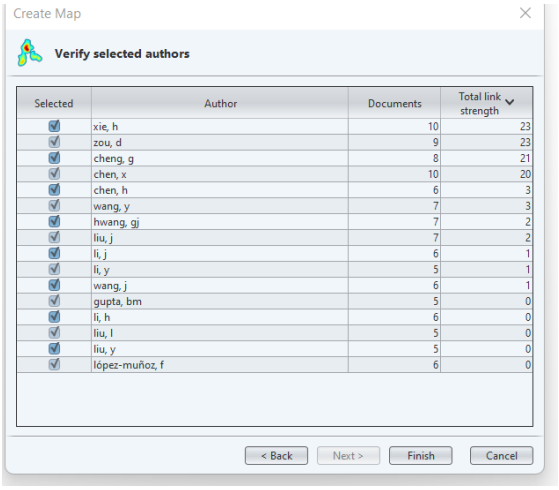

Figure 2. The most prolific writers

The visualization of anviety mathematics displayed by vosviewer is obtained from a binary calculation with a minimum number of occurrences of 8. It turns out that out of 4978 terms, 163 were selected to meet the criteria. After verification, the existing terms were selected again to only 96 terms. Furthermore, vosviewer makes 3 different visualizations, namely the network visualization which will be shown in Figure 3, the overlay visualization in Figure 4 and the density visualization which can be seen in Figure 5. The network serves to show network between terms that are visualized, if the path or network in the analysis bibliometrics in bold, then it shows a relationship between one term (term) with other terms (terms) that are quite numerous and strong, on the contrary if the relationship between terms (terms) with one another in thin print with small circles, then it is shows a weak relationship between the terms observed (Nurul & Winoto, 2022).

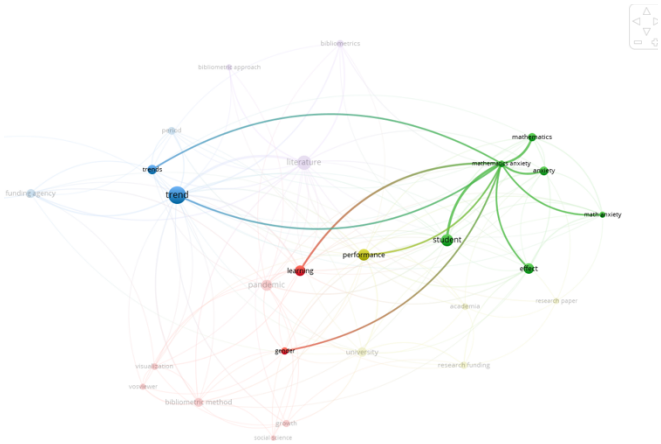

Figure 3. Network Visualizationq

The overlay serves to display historical traces of research. The darker the visualization of the bibliometric analysis, the longer the research that has been carried out, if the visualization shows a light color, the research will be conducted in the near future. For example, bibliometric analysis in the 2018 to 2021 timeframe.

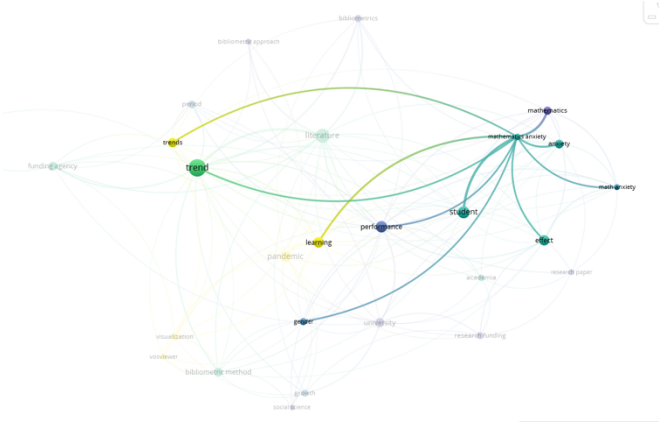

Figure 4. Overlay Visualization

Based on Figure 5, this Density Visualization shows that 2021 will display the brightest network. The last visualization is density, density serves to display the density or emphasis on the research group. This visualization of bibliometric analysis can be used to determine areas of research that are still rarely done or that have been done a lot. For researchers, this is certainly very useful if they want to do research (Nurul & Winoto, 2022).

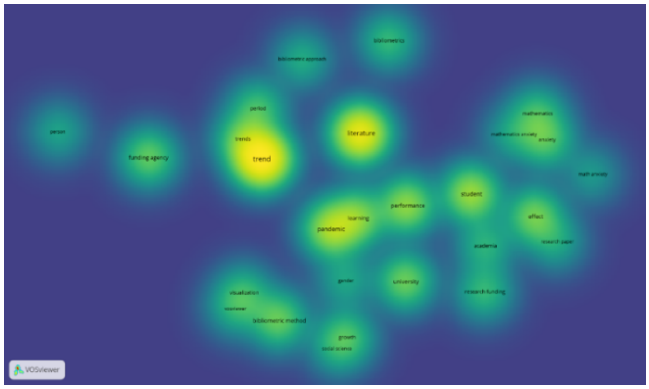

Figure 5. Density Visualization

The figure shows that the discussion on the topic of policy gender is green and slightly yellow, which means that the topic of policy mathematics anxiety has not received many updates from previous researchers. On the other hand, the discussion about the phenomenon of bright yellow literature means that there have been many updates from the results of previous research (Reforma & Asia, 2021). In order to clarify the visualization, the twenty-seven items are grouped into 5 closely related clusters. The cluster distribution can be seen in table 3 below:

Tabel 3 Cluster results from overlay dan network visualisation

Cluster	Colour	Items
1	Red	Bibliometric method, gender, growth, learning, pandemic, social science, visualization, vosviewer.
2	Green	Anxiety, effect, math anxiety, mathematics, student.
3	Blue	Funding agency, period, person, trend.
4	Yellow	Academia, performance, research funding, research paper, university
5	Purple	Bibliometric approach, bibliometrics, literature

Visualization of mathematics anxiety obtained 4978 terms and 163 keywords that met the threshold. Of the 163 keywords selected back into 96 keywords. It can be seen in Figure 4 that these keywords are grouped into 5 clusters. Cluster 1 is marked in red, there are 8 topics, namely Bibliometric method, gender, growth, learning, pandemic, social science, visualization, vosviewer. In cluster 2, marked in green, there are 6 topics, namely Anxiety, effect, math anxiety, mathematics, student. In cluster 3 marked in blue, there are 4 topics, namely Funding agency, period, person, trend. In cluster 4 marked in yellow, there are 4 topics, namely Academia, performance, research funding, research paper, university. In cluster 5 marked in purple, there are 3 topics, namely Bibliometric approach, bibliometrics, literature.

In the visualization overlay, the latest research shows up too much. The blue color indicates that the research topic is a past topic. While the yellow color indicates that the research topic is a current topic that can be used as a topic for future research. It can be seen in Figure 5 that the keyword mathematics anxiety has a fainter yellow color than the other keywords. This means that the level of use in research is low. While the gender keyword has a faded green color. This means that this topic has not been widely researched.

The visualization map produced by VOSviewer which shows mathematics anxiety and gender has an opportunity to produce novelty in future research. Results from Google Schoolar indexed research publications that examine mathematics anxiety with Indonesian articles. The following is a table of researchers on mathematics anxiety from Indonesia. The researchers hereby review the top 10 articles in Publish or Perish with the keywords "Mathematical Anxiety, Gender" from 0-2022 with a maximum number of 200. Taken in 2022 this is because in the graph in Figure 2 has a blank sign so that researchers want to look deeper into the results of articles related to the title in 2022 using journal matrices. Journal metrics are a way to dig deeper from the novelty that has been obtained. This is used in an effort to strengthen and find relevant references according to keywords.

Table 4. Mathematical anxiety analysis matrix

Author / Year	Research Topic	Method	Results
Urwatil Usqo, Yenita Roza, Maimunah/ 2022	Error in solving the problem congruent and similarity on female and male students.	Qualitative descriptive with test and interview data collection techniques.	Female students experienced lower errors than boys. The biggest mistake of men is the lack of thoroughness in doing things in a hurry.
Fauziah Apriyani dan Adi Ihsan Imami/ 2022	Learning mathematics at the time of face-to-face learning is limited	Qualitative descriptive with test and non-test data collection techniques	Students with very high anxiety category have poor mathematical problem solving abilities.
Dyah Haerunnisa dan Adi Ihsan Imami/ 2022	Mathematical anxiety	Descriptive with a qualitative approach, distributing questionnaires.	The average level of mathematical anxiety experienced by junior high school students is moderate.
Dina Julya dan Iyan Rosita Dewi Nur/ 2022	Mathematical anxiety	Studi literatur	Learning outcomes affect the mathematical anxiety experienced by students.
Yusuf Ramdani, Syamsuri Syamsuri, & Aan Subhan Pamungkas/ 2022	Describe the characteristics of high school students' anxiety in learning mathematics	Qualitative descriptive. Collecting data using observation, interviews and documentation.	The characteristics of mathematics anxiety are divided into types of anxiety, types of anxiety in the learning process, and types of anxiety in evaluation.
Novila Muhsana & Hafsah Adha Diana / 2022	Knowing the relationship and the influence of anxiety levels	Quantitative research with method associative. collection technique	Show that there is a negative relationship between math anxiety and ability

Author / Year	Research Topic	Method	Results
	mathematics on students' mathematical reasoning abilities in solving problems PISA-based mathematics.	data using a math anxiety questionnaire and reasoning ability test questions mathematics based on PISA problems.	students' mathematical reasoning with a large correlation of -0.178 and there is no significant effect significant relationship between math anxiety on mathematical reasoning ability students in solving PISA-based math problems
Alissa Az Zahra & Windia Hadi / 2022	Relationship between Mathematics Connection Ability (MCA) and Mathematical Resilience (RM) owned by students.	Qualitative research with descriptive approach	Students with high MCA and MR in the female sex are superior to the male gender, but on the other hand students who have moderate and low MCA and MR in the male gender are superior to the female.

Reviewing from table 4 above what the author has done, it can be seen that there are only 7 published articles in Indonesia for mathematics anxiety in 2022. This can be used as a relevant reference in conducting further research.

4. Conclusion

In learning mathematics through bibliometric analysis, it shows the results of increasing math anxiety in 2021, this is due to the Covid-19 pandemic. The article with the most citations, namely 885 citations, was written by X Zhou, CL Snoswell, LE Hardin with the article title "The role of telehealth in reducing the mental health burden from COVID-19". The publisher that publishes the most scientific articles on mathematics anxiety is liebertpub.com with 885 publications. The most prolific researcher is Haoran Xie with 1 published article. Terms mathematics anxiety has a fairly strong relationship in its visualization. A research phenomenon that can be used as an opportunity for further research related to mathematics anxiety with terms including gender.

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