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Development Analysis Research on Physical Education by Mapping Keywords Using the Vosviewer Application

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ABSTRACTS

This research was conducted with the aim of conducting a bibliometric analysis within the scope of physical education. The research method used is bibliometric analysis using VOSviewer as a key tool, Publish or Perish as a data collection tool and Ms. Excel as a data processing tool. Bibliometric analysis research has 4 stages, namely: (i) data search (ii) data processing (iii) data destruction (iv) data analysis. Research data materials were collected from the Google Scholar database from 2018 to 2022. The search process was carried out using the keyword "physical education". The results of the research show that physical education research has decreased in 2018 – 2022. It is hoped that this research can assist other researchers in determining the topics to be studied. This research is expected to be used as study material and reference material for further research in determining the field of study and research novelty to be carried out.

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1. INTRODUCTION

Physical is a form of individual and community education that prioritizes physical movements that are carried out consciously and systematically towards a higher quality. According to Efrizon Umar, physics science is the basic science of the whole science. Meanwhile, according to Bambang Ruwanto, physics science is a basic science that is included in the fundamental science (Carleo *et al*., 2019). Degree in Sports Science Sports science is basically rooted in the knowledge that encompasses life and human life which is multi-dimensional. Life and human life are always in the dimensions of birth, development and death; physical, mental, and emotional dimensions; biological, personal, and behavioral dimensions; individual and social dimensions; dimensions of space and time; natural, humanistic, and cultural dimensions.

In the world of physical education, students have also been obtained since they were in elementary school (SD) (Wambugu & Changeiywo, 2008). Sports science can help students always think logically, be responsive, and make it easier to learn other fields.

Research related to physical education has been carried out by many researchers before. This can be seen in **Table 1**. **Table 1** shows some of the previous studies on physical education. Although many have done research related to physical education, there are still few who use bibliometric analysis in the process of mapping data.

Table 1. Previous research on physical education.

No	Cites	Authors	Title	Year
1	980	Bailey *et al*. (2009)	The educational benefits claimed for physical education and school sport: an academic review	2009
2	132	Opstoel *et al*. (2020)	Personal and social development in physical education and sports: A review study	2020
3	295	Vasconcellos *et al*. (2020)	Self-determination theory applied to physical education: A systematic review and meta-analysis.	2020
4	82	Bores-Garcia (2021)	Research on cooperative learning in physical education: Systematic review of the last five years	2021
5	98	Varea *et al*. (2022)	Exploring the changes of physical education in the age of Covid-19	2022
6	136	Azimovna (2020)	Formation of spiritual and moral values of pupils in physical education lessons	2020
7	136	Jeong and So (2020)	Difficulties of online physical education classes in middle and high school and an efficient operation plan to address them	2020
8	100	Fernandez *et al*. (2020)	Gamification and physical education. Viability and preliminary views from students and teachers	2020
9	200	Varea & Gonzalez-Calvo (2021)	Touchless classes and absent bodies: teaching physical education in times of Covid-19	2021
10	107	Hinojo Lucena *et al*. (2020)	Academic effects of the use of flipped learning in physical education	2020

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This bibliometric analysis is carried out to find out how often research on physical education is carried out. The mapping is carried out using one of the software, namely VOSviewer. This VOSviewer is used to visualize bibliographis or data sets (Nandiyanto *et al*., 2021). We have done a more detailed explanation of the VOSviewer application in previous research (Al Husaeni & Nandiyanto, 2022a).

This study aims to conduct bibliometric engineering regarding physical education by combining mapping analysis using VOSviewer. In addition, this research is also expected to be helpful and become a reference for researchers in determining the research topics to be carried out, especially those related to physical education.

2. METHODS

The article data used is obtained from articles that have been published and have been indexed by Google Scholar. Google Scholar is used because of its open source database. Publish or Perish as a reference manager application is used to conduct regular reviews on topics that we will research. More detailed information on how to use and install the software has been explained in our previous research (Al Husaeni & Nandiyanto, 2022b). This research is divided into 4 stages, namely:

(i) Collection of publication data using the Publish or Perish application.
(ii) Bibliometric data processing using Microsoft Excel application.
(iii) Computational mapping analysis of bibliometric publication data using VOSviewer applications.
(iv) Analysis of computational mapping results.

The Publish or Perish application is used to filter the data of articles that have been published by using the keyword "Physical Education" based on the title of the publication. The articles used are articles that have been published in 2018 – 2022. The articles that have been collected and fit the criteria of this research analysis are then exported into two types of files: the research information system (.ris) and the comma-separated value format (*.csv). VOSviewer is also used to visualize and evaluate trends using bibliometric maps. VOSviewer is used to create 3 types of mapping visualizations, namely network visualization, density visualization, and overlay visualization. When creating a bibliometric map, the frequency of keywords is set to be found at least 10 times.

3. RESULTS AND DISCUSSION

3.1. Research developments in the field of physical education

The development curve of physical education research over the last five years (2018-2022) can be seen in **Figure 1**. Based on **Figure 1**, the development of physical education research over the past five years, from 2018-2022 has experienced a significant decline. In 2018, research on physical education reached 371 articles (37.86%) published and indexed by Google Scholar. In the following year, the number of publications on physical education continued to decline. In 2019 it became 254 (25.92%). Likewise, in the following years (2020, 2021) it continued to decline to 224 (22.86%) and 79 (8.06%) articles respectively. Physical education research will still decline in 2022, namely 52 (5.31%) articles out of 79 articles (8.06%). A clearer explanation can be seen in **Table 2**.

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Table 2. Development of research on physical education.

Year	Count	Percentage (%)
2018	371	37.86
2019	254	25.92
2020	224	22.86
2021	79	8.06
2022	52	5.31
Total	980	100

Based on **Figure 1**, it can also be seen that the decrease in the number of publications regarding physical education occurred due to the COVID-19 outbreak (Nandiyanto *et al*., 2021). This results in all activities being restricted. After the outbreak began to subside, namely in 2022, the number of publications has increased again.

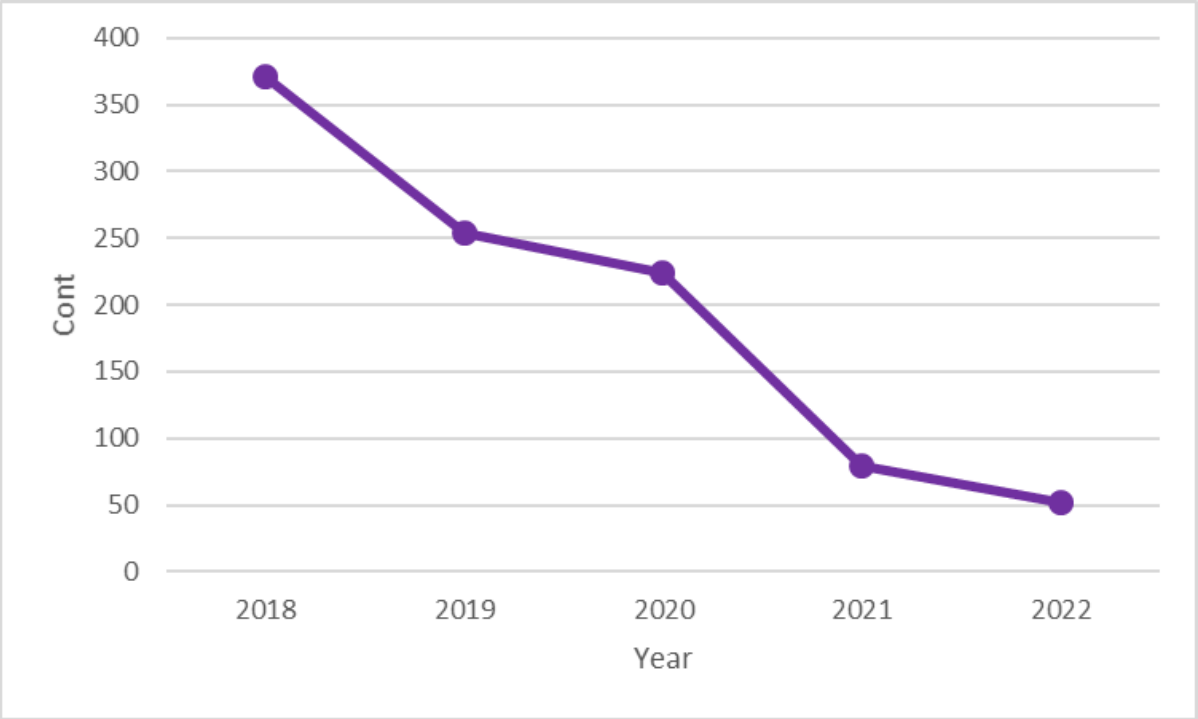

Figure 1. Level of development of research on physical education.

3.2. Clusters resulting from the VOSviewer mapping of physical education

Mapping using VOSviewer generates several terms related to the keyword "Physical Education". These terms are divided into clusters. Each cluster has a different number of terms and colors. Different colors serve to distinguish between clusters from one another (Al Husaeni & Nandiyanto, 2023). The following is a cluster division of VOSviewer mapping results with the keyword "Physical Education":

(i) Cluster 1 is marked in red and has 20 items, namely academic performance, activity, body, body mass index, effect, formation, importance, influence, life, obesity, parent, physical

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education class, physical fitness, physical training, quality, relationship, schoolchild, skill, training, and week.

(ii) Cluster 2 is marked in green and has 20 items, namely adult, age, association, covid, cross sectional study, gender, individual, level, mental health, older adult, pandemic, person, physical activity, physica activity level, Physical exercise, physical inactivity, relation, sedentary behavior, type, and vigorous physical activity.

(iii) Cluster 3 is marked in blue and has 17 items, namely adolescent, child, curriculum, effectiveness, evidence, fitness, health, health education, intervention, paper, physical education lesson, physical literacy, program, recreation, school, school physical education, and youth.

(iv) Cluster 4 is marked in yellow and has 13 items, namely approach, group, perception, pete, physical education, physical education teacher, physical education teacher education, practice, subject, teacher, teaching technology, and use.

(v) Cluster 5 is marked in purple and has 12 items, namely analysis, attitude, class, context, disability, inclusion, model, participant, participation, question, self, and student.

(vi) Cluster 6 is marked in light blue and has 8 items, namely children, development, education, exercise, physical, physical culture, sport, and work.

(vii) Cluter 7 is marked in orange and has 7 items, namely basketball player, body composition, comparative study, difference, motor skill, research, and study.

3.3. Visualization of physical education keyword

Based on Al Husaeni and Nandiyanto (2022), the minimum number of connections between one term and another is 2 terms. VOSviewer displays three types of visualizations, namely network visualization (**Figure 2**), overlay visualization (**Figure 3**), and density visualization (**Figure 4**). Based on **Figure 2**, you can see the relationship of each tribe. The relationship is described by a line that is passed down from one term to another. In addition, **Figure 2** also shows the grouping of each topic area studied. Based on the keywords used, there are 7 clusters with a total of 125 terms described in point 3.2. previously. In **Figure 3** we can see research relevant to keywords by year. Whereas in **Figure 4**, the lighter the color, the more frequently the term is studied.

3.4. Mapping visualization based on author

Each node in the network represents an entity (for example, articles, authors, countries, institutions, keywords, journals) (Al Husaeni & Al Husaeni, 2022), and in the case shown in **Figure 5** there are several descriptions, including: The size of the cover color indicates the occurrence of the author name, The relationship between nodes represents the co-occurrence between authors, The thickness of the link indicates the co-occurrence between authors (i.e., the number of times an author occurs or occurs concurrently), The larger the node, the greater the author appears/conducts research, and The more the thicker the links between nodes, the greater the co-occurrence between authors (Al Husaeni & Al Husaeni, 2022). Each color represents a thematic cluster, where the nodes and links within the cluster can be used to explain the scope of the topic (node) of the theme (cluster) and the relationship (link) between the topics (nodes) that materialize under that theme (cluster) (Al Husaeni & Al Husaeni, 2022).

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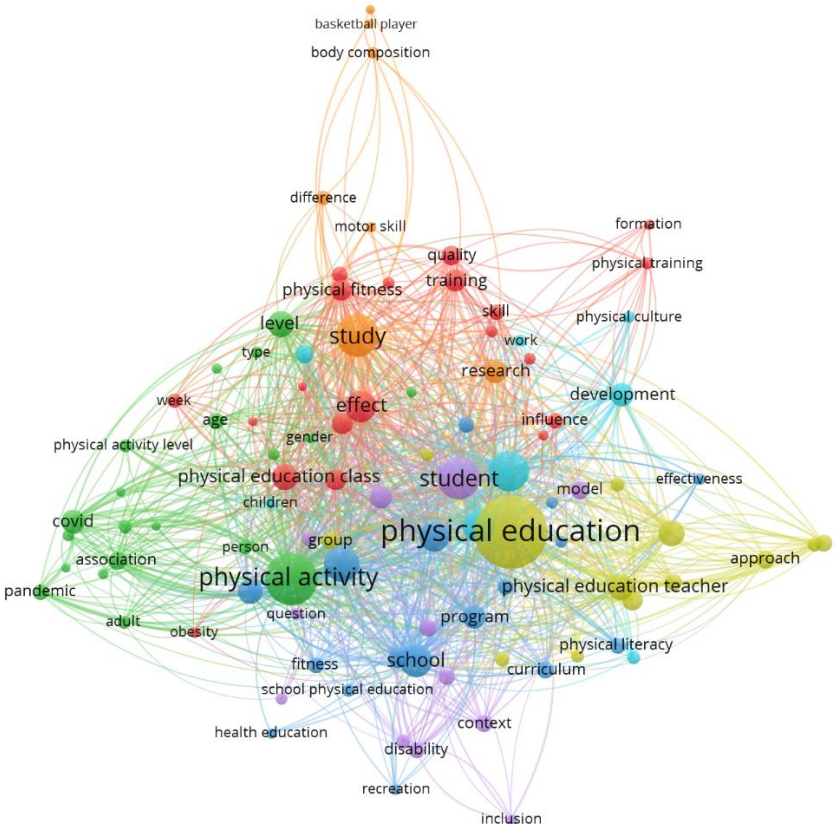

Figure 2. Network Visualization based on co-word.

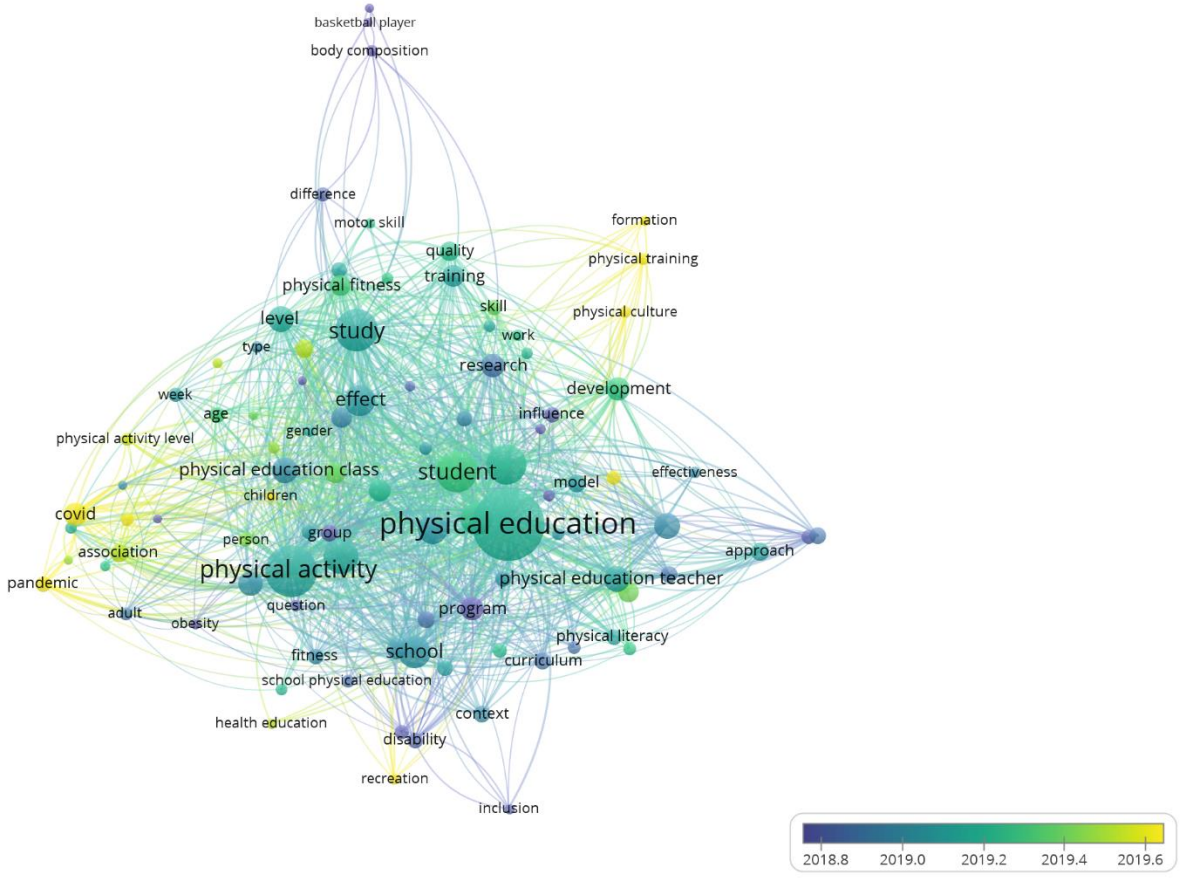

Figure 3. Overlay Visualization based on co-word.

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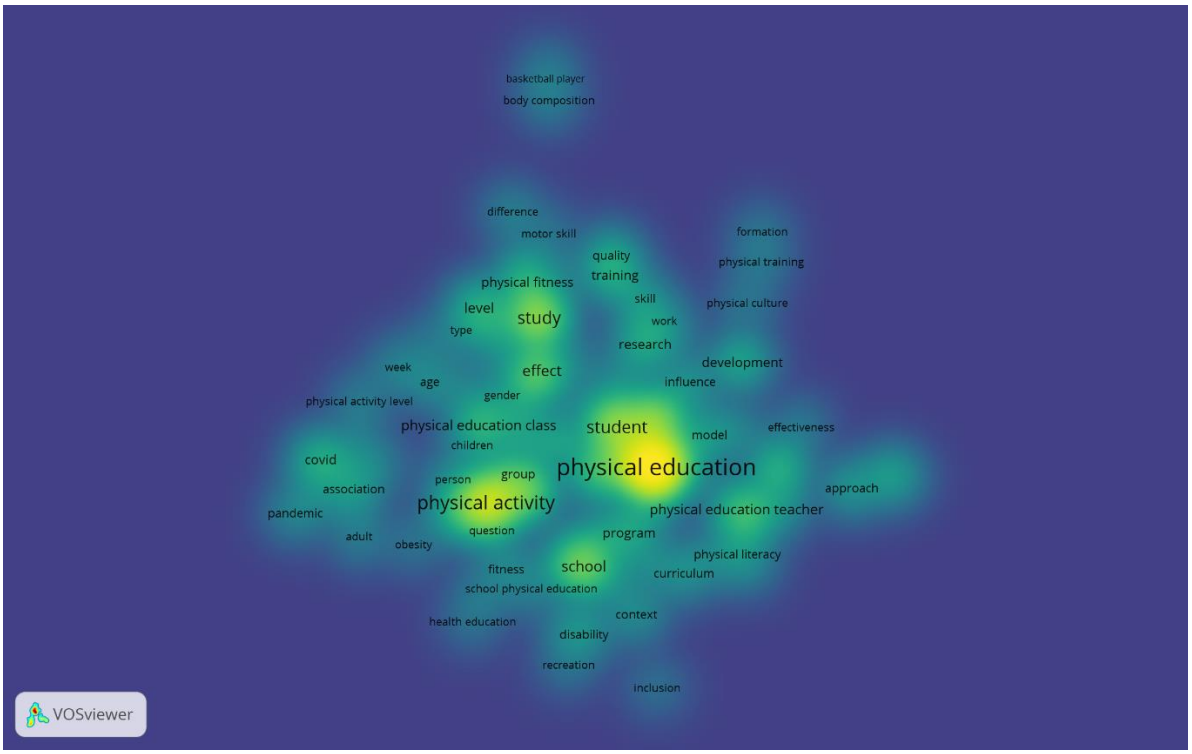

Figure 4. Density Visualization based on co-word.

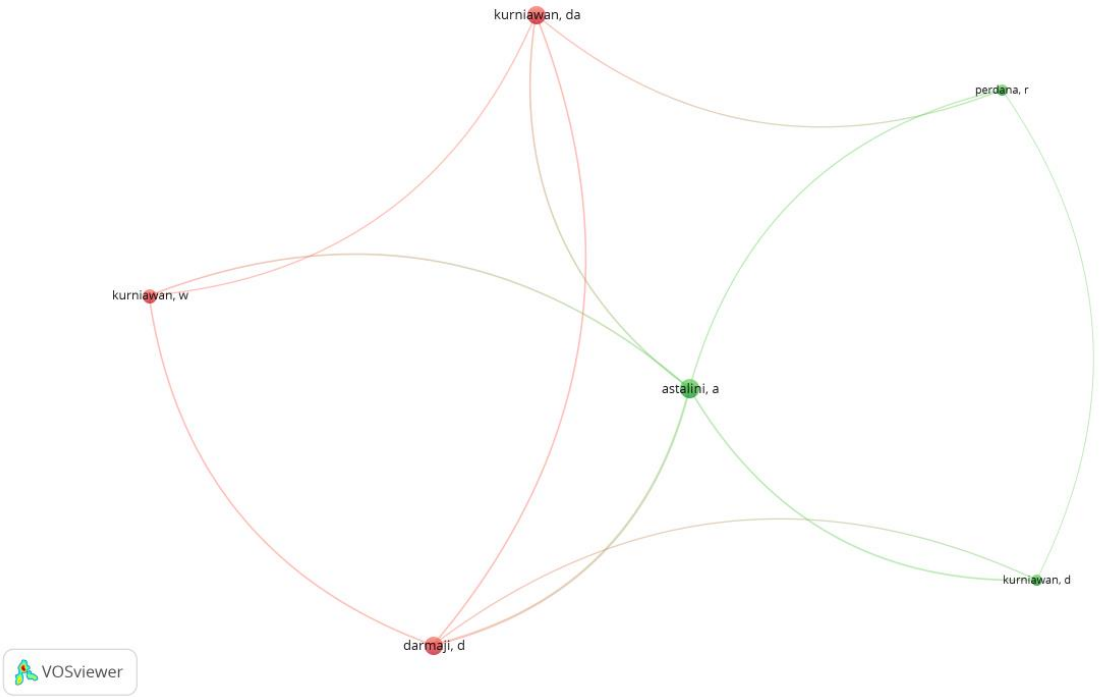

Figure 5. Network Visualization based on authors.

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Based on **Figure 5**, it can be seen that there are 6 authors who have conducted a lot of research on physical education. Each author has a relationship between one and the other authors. **Figure 5** also shows the number of publications from each author, such as Kurniawan, Da with 8 documents, Kurniawan, W with 5 documents, Darmaji, D with 8 documents, Astalini, A with 9 documents, Perdana, R with 3 documents and Kurniawan, D as many as 3 documents.

4. CONCLUSION

This study aims to analyze bibliometrics in the scope of physical education by visualizing the results of the VOSviewer data mapping analysis into 3 forms of visualization, namely network, overlay, and density. A total of 980 articles appear in search results as relevant articles. The findings show that from 2018 to 2021 articles on physical education have decreased from 2018 - 2022, which was initially 371, continuing to decrease to 79 articles. The phrases most often used to describe physical education research are physical education, physical activity, and student. The writer who often conducts research on physical education is Astalini, A, with 9 documents.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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