

MAPPING CRITICAL THINKING RESEARCH IN PHYSICAL EDUCATION: A REVIEW OF THE PUBLISHING OR PERISH LITERATURE AND BIBLIOMETRIC ANALYSIS

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Abstract

Although the idea of combining critical thinking with physical education is seen as a contradiction in terms, the PE strategy is ideal and capable of developing critical thinking skills. The purpose of writing this paper is to provide a bibliometric review of literature on "critical thinking physical education". Search articles using Publishing or Perish (PoP) software with a database from Google Scholar. Of the 440 articles found from the Google Scholar database from 2000 to 2021, 91 articles were analyzed in this study. The selected references are then managed using reference manager software, namely Mendeley in the form of RIS and analyzed using VOSviewer software. Based on the VOSviewer analysis, the keywords that most often appear are critical thinking, student, teacher, and physical education. Meanwhile, what did not appear much were keywords related to gender, creative thinking and culture intelligence which could eventually become the research agenda in the future. Overall, this review provides an appropriate reference point for further research on "critical thinking physical education".

Keywords: Sports psychology. Sport Exercise. Bibliometric analysis. Critical thinking. Physical education.

Resumen

Aunque la idea de combinar el pensamiento crítico con la educación física se ve como una contradicción, la estrategia de educación física es ideal y capaz de desarrollar habilidades de pensamiento crítico. El propósito de escribir este artículo es proporcionar una revisión bibliométrica de la literatura sobre "pensamiento crítico en educación física". Busque artículos utilizando el software Publishing or Perish (PoP) con una base de datos de Google Scholar. De los 440 artículos encontrados en la base de datos de Google Scholar desde 2000 hasta 2021, en este estudio se analizaron 91 artículos. A continuación, las referencias seleccionadas se gestionan con el software de gestión de referencias, a saber, Mendeley en forma de RIS, y se analizan con el software VOSviewer. Según el análisis de VOSviewer, las palabras clave que aparecen con mayor frecuencia son pensamiento crítico,

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estudiante, maestro y educación física. Mientras tanto, lo que no apareció mucho fueron las palabras clave relacionadas con el género, el pensamiento creativo y la inteligencia cultural que eventualmente podrían convertirse en la agenda de investigación en el futuro. En general, esta revisión proporciona un punto de referencia apropiado para futuras investigaciones sobre "educación física de pensamiento crítico".

Palabras clave: Análisis bibliométrico. Pensamiento crítico. Educación física.

Abstrato

Embora a ideia de combinar o pensamento crítico com a educação física seja vista como uma contradição em termos, a estratégia de EF é ideal e capaz de desenvolver habilidades de pensamento crítico. O objetivo de escrever este artigo é fornecer uma revisão bibliométrica da literatura sobre "educação física de pensamento crítico". Pesquise artigos usando o software Publishing or Perish (PoP) com um banco de dados do Google Scholar. Dos 440 artigos encontrados na base de dados Google Acadêmico de 2000 a 2021, 91 artigos foram analisados neste estudo. As referências selecionadas são então gerenciadas usando o software gerenciador de referências, Mendeley na forma de RIS e analisadas usando o software VOSviewer. Com base na análise do VOSviewer, as palavras-chave que mais aparecem são pensamento crítico, aluno, professor e educação física. Enquanto isso, o que não apareceu muito foram palavras-chave relacionadas a gênero, pensamento criativo e inteligência cultural que poderiam eventualmente se tornar a agenda de pesquisa no futuro. No geral, esta revisão fornece um ponto de referência apropriado para novas pesquisas sobre "educação física de pensamento crítico".

Palavras-chave: Análise bibliométrica. Pensamento crítico. Educação física

Introduction

Education that is implemented with critical thinking has gained universal recognition that it can be applied to various levels of learning. Learning outcomes that expect students to have critical thinking skills are very valuable for the future of students, including being able to prepare individuals to overcome various challenges that will be faced in personal life, career development, and duties as responsible citizens (Tsui, 2002). The manifestation of the implementation of critical thinking is to encourage students' cognitive abilities that begin with a natural mental formation process as well as planned

and systematic in the context of space, time with the learning tools used (Kuswana, 2011), to produce learning outcomes that make students always able to solve problems effectively, effectively and efficiently (Ennis, 1991).

The close relationship between cognitive, affective, and psychomotor taxonomy which is the main element in Physical Education (PE), makes learning methods that foster critical thinking attitudes into a spectrum that can complement learning in PE (Gillespie & Culpan, 2000). The idea of combining critical thinking with PE can even be seen as a contradictory endeavor. However, early research has shown, however, that PE strategies are ideal and capable of developing critical thinking (McBride, 1989); (McBride, 1995). McBride's explanation of critical thinking learning implemented in PE (or other) classes, at first students must first demonstrate a "disposition" effort regarding certain constructive behavioral tendencies for critical thinking processes-such as being open-minded, sensitive to other people's ideas, cooperative, and willing to take risks (McBride, 2004). This disposition supports and encourages critical thinking processes (Beyer, 1987), that a lack of any of them can mean that critical thinking will not occur. Therefore, engaging students in critical thinking in physical education is a very demanding and diverse pedagogical task. This effort requires a lot of planning, when to provide students with domain-specific knowledge, teach students the benefits of critical thinking, and encourage students to describe dispositions that are pleasing to students (Pill & SueSee, 2017).

Various curriculum frameworks (PE) now explicitly state the inclusion of processes of critical inquiry, development of creativity and problem solving skills. The international baccalaureate middle years program (IBMY), which focuses on youth education, has the goal of "it provides a framework of learning that encourages students to become creative, critical and reflective thinkers" (International Baccalaureate Middle Years Program, 2014). The Australian Curriculum for Health and Physical Education (ACHPE) incorporates a critical inquiry approach of five key ideas from the future orientation of physical education. "that assists students in researching, analyzing, applying and appraising knowledge in health and movement fields" (Australian Curriculum and Assessment Authority, 2016), they acknowledge that values, behaviors, priorities and actions related to health and physical activity reflect various contextual factors that affect the way people live. The curriculum develops an understanding that the meanings and interests of individuals and social groups in relation to health practices and physical activity participation are

diverse and therefore require different approaches and strategies (Australian Curriculum and Assessment Authority, 2016).

PE programs that promote cognitive dimensions in learning are not a new concept, recent developments in curriculum frameworks around the world have formalized the rationale for critical thinking, problem solving and creativity in PE as elements both in curriculum design and in student achievement standards. McBride, (2004) suggests that if sports teachers intentionally structure lessons with the need for critical thinking and creativity in thinking [7], students will learn cognitive skills and the dispositions that support them will be strengthened. Meanwhile, Russell et al. (2011) concluded that physical activity and fitness classes should be "a laboratory for critical thinking." Learning content must provide a meaningful structure for students, because health content is universal and applies to all (Russell et al., 2011). The fitness and health classroom environment is a logical effort to provide students with the opportunity to apply critical thinking processes to relevant health information (Block & Russell, 2012). Through collaboration and active learning strategies, students are better able to demonstrate critical thinking skills than students whose teachers teach and use few interactive strategies. The contributions offered are assessed as promoting and advocating for personal, social and community health and well-being (Welch et al., 2021).

The concept of critical thinking in education has been discussed for a long time. Sternberg, (1985; 1986) describes critical thinking in the context of its origin, how to assess and improve it in the learning process. Even articles about critical thinking with bibliometric analysis already exist, including those that discuss physics learning during the Covid-19 Pandemic (Jatmiko et al., 2021), while other research results discuss critical thinking in basic education units (Kaliska & Ticha, 2018). In the existing literature, a number of concepts that are relevant to critical thinking in PE are to inform that developing critical thinking skills in students in physical education is as important as other academic subjects (Blitzer, 1995; Humphries, 2014), efforts to foster critical thinking attitudes through PE (Abdullah et al., 2014; Lodewyk, 2009; Dupri et al., 2020), other strategies using active learning (Nelson & Crow, 2014) using media "Cylinder Ball" (Konukman & Docheff, 2010), and which has received much attention on "critical thinking skills" in physical education (McBride, 1989; Prasetyo, 2017; Dogan et al., 2020; Huang & Ning, 2021). Although, there have been many studies discussing critical thinking in the world of physical education, until now there has never been a bibliometric analysis using the term "critical thinking physical education" (CT-PE).

Considering the reasons stated above, this paper aims to fill the research gap by providing an extensive bibliometric analysis of the literature in relation to CT-PE. Articles published and indexed by Google Scholar (GS) are analyzed and categorized by distribution and author affiliation. This analysis can see what research topics are the subject of more publications, and future "critical thinking physical education" topics that provide opportunities for further research. To guide this literature review framework, the following research questions will be explored: (1) How is critical thinking physical education research classified? (2) What is the overall trend in critical thinking physical education research to become a more published subject? Who are the main actors in terms of journals, countries/regions and institutions in the research area?

Research Methods

This bibliometric literature review is based on systematic, explicit and reproducible methods (Reyes & Arturo, 2015; Higgins et al., 2019), or idea mapping methods that emphasize the boundaries of knowledge (Souza, 2007). This research method adopts the five-step method from (Souza, 2007; Hudha et al., 2020).

Define keywords for search

The literature search was conducted in September 2021 with the keywords "critical thinking physical education". Google Scholar (GS) was chosen because it is currently the largest database while Publish or Perish (PoP) was chosen because it proved to be the most effective way to search for articles on GS (Baneyx, 2008; Hodge & Lacasse, 2011). The first search entered a query language into PoP software with the keyword "critical thinking physical education".

Initial search results

This search for articles was conducted through the 'keyword' column only, and the years '2000-2021'. The results are compiled in a Research Information Systems (RIS) format to include all important article information such as paper title, author name and affiliation, abstract, keywords, and references from the articles found.

Search results improvements

Before the data is saved into the RIS format, the corresponding articles indexed in the GS database are then filtered. These, theses and dissertations; Proceeding articles, newspapers, books, book reviews, and book chapters

are not included in this data. Only selected journal articles. Then to make appropriate repairs, the file is saved in the form of a RIS file. The RIS data was imported into the Mendeley bibliography software.

Compiling initial data statistics

The collected data is stored in the form of RIS. In the initial stage, the components of the complete journal article (year of publication, volume, number, pages, etc.) are checked and we add the necessary information if incomplete data is found. Data analysis was carried out so that articles could be classified based on the year and source of publication and publisher.

Data analysis

Bibliometric analysis in searching this data used PoP software (Baneyx, 2008; Jacsó, 2009), while to analyze and visualize the bibliometric network, Vosviewer software was used (Martínez-López et al., 2020; Al Husaeni & Nandiyanto, 2022). VOSviewer is used because of its ability to work efficiently with large datasets and provides a variety of interesting visuals, analysis, and investigations (Eck & Waltman, 2014). Vosviewer can also create publication maps, author maps, or journal maps based on co-citation networks or to build keyword maps based on shared networks, while to map authors based on institutional area maps using GPSVisualizer (<http://www.gpsvisualizer.com/geocoder/>).

Results and Discussion

The research results are presented based on the search output from the PoP software and analyzed through the VOSviewer software to determine the keywords that appear most often. In addition, the number of keywords that appear most often is adjusted to the needs of data collection and analysis. VOSviewer is used to visualize bibliometric maps. This software displays bibliometric mapping on three different visualizations namely, network visualization, overlay visualization, and density visualization.

The search results from the PoP software in the early stages yielded 999 data. These results include articles from scientific journals, conference papers, books, book chapters and academic theses. Then we made improvements by selecting only articles published in scientific journals. A total of 440 articles were obtained in the second improvement result with 444789 citations (20217.68 citations/year). This data has been well verified in the GS database from the year 2000-2021 with the search keyword 'critical thinking physical education'. After that, we made improvements by identifying 91 articles grouped from the GS database; the citation data also changed, with 3142 citations and 142.82 citations/year. The complete results of the comparison of metric data from the initial search and enhanced search can be seen in Table 1 (Tables 1-4).

The researcher tries to present the most relevant contributions in this research. The step taken was to take 91 articles with the keyword 'critical thinking physical education' which had the highest citation value (top 10 articles cited). The results are obtained as in Table 2. The top 4 publishers who publish articles on this topic are presented in Table 3. Journals that have relevant articles are presented in Table 4.

The data network visualization display on GS data related to the keyword 'critical thinking physical education' that has been refined in search can be seen in Figure 1, overlay visualization can be seen in Figure 2, and visualization of density in Figure 3 (Figures 1-3).

These results are found based on the title, keywords, and abstract with a thorough calculation of the minimum number of occurrences set to 8 (eight). Found as many as 49 items that meet the criteria. Each item that represents the keyword is added, which is indicated by the size of each occurrence of the item. In other words, item size indicates the number of times a keyword appears together. There are five groups identified in this analysis. The keywords that

Table 1: Comparison metrics of PoP results.

Metrics data	Initial search	Refinement search
Source keyword	'critical thinking physical education'	'critical thinking physical education'
Publication year	2000-2021	2000-2021
Papers	442	91
Citations	444789	3142
Cites/year	20217.68	142.82
Cites/paper	1010.88	34.53
Author/paper	2.35	2.33
h_index	298	30
g_index	440	55
h1_norm	263	22
h1_annual	11.95	1.00

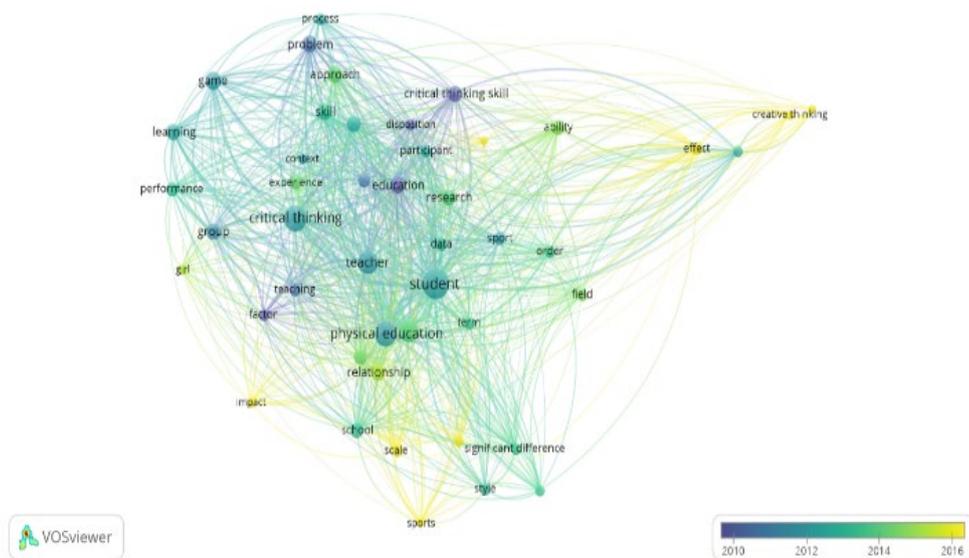


Figure 2: Visualization of overlays in the GS data base.

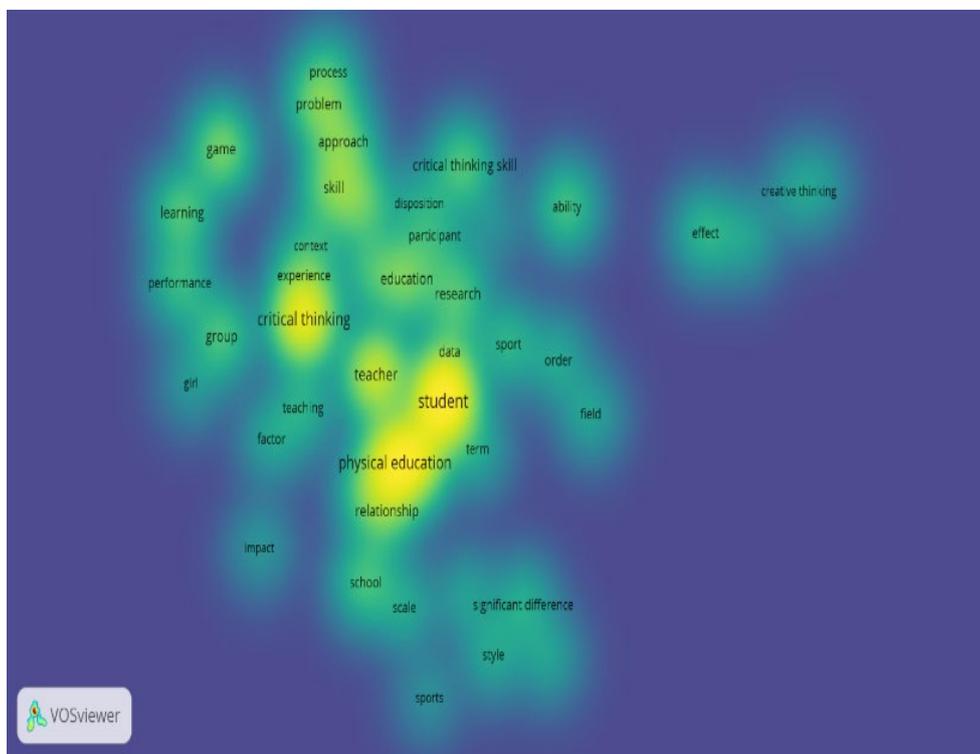


Figure 3: Visualization of density in GS data base.

Table 5: Keywords representing each cluster.

No	Cluster	Element
1	The first cluster (red)	approach (36), context (13), critical thinking (107), development (34), disposition (13), education (41), participant (16), problem (38), process (18), skill (38), sport (), term (15), thinking (24)
2	The second cluster (green)	analysis (27), critical thinking disposition (14), gender (13), impact (10), physical education (96), relationship (31), scale (16), school (30), significant difference (18), sports (22), student (156), study (75), style (16)
3	The third cluster (blue)	ability (29), creative thinking (11), critical thinking skill (33), culture intelligence (9), effect (22), field (15), order (16), physical education student (14)
4	Fourth cluster (yellow)	experience (21), factor (15), game (45), girl (10), group (31), learning (33), performance (26)
5	The six cluster (purple)	data (19), reflective thinking (8), research (32), teacher (81), teaching (19)

between TGfU and critical thinking in Physical Education, such as research from (Wallian & Chang, 2007; Harvey et al., 2013; Bayu & Setyawan, 2015).

Meanwhile, based on data, there is one publisher with the highest citation frequency, namely Taylor & Francis. In addition, Taylor & Francis are also the

publishers who contributed the most articles on the topic of 'critical thinking physical education' with 25 articles, followed by ERIC publishers with 6 articles and 5 articles each from Human Kinetics and ProQuest publishers, while Academic Journals contributed 4 articles. For other publishers, an average of

Table 6: Author with Number of Articles and Research Network.

No	Author Name	Document (article)	Total link strength
1	Huang, M.Y.	4	10
2	McBride, R.E.	3	5
3	Shih, K.T.; Xiang, P.	2	5
4	Certel, Z.	2	4
5	Kirk, D.	2	3
6	Tinning, R.; Demirhan, G.; Sacli, F.; McPhail, A.	2	2
7	Yu, Y.T; Yu, Y.; Yu, G.; Yang, G.; Wang, W.Y.; Tu, H.Y.; Cheng, J.F.; Chen, C.H.; Chiang, T.H.; Liao, I.A.; Lin, H.C.; Pimg, Y.; Tao, K.; Teng, J.Y.	1	4

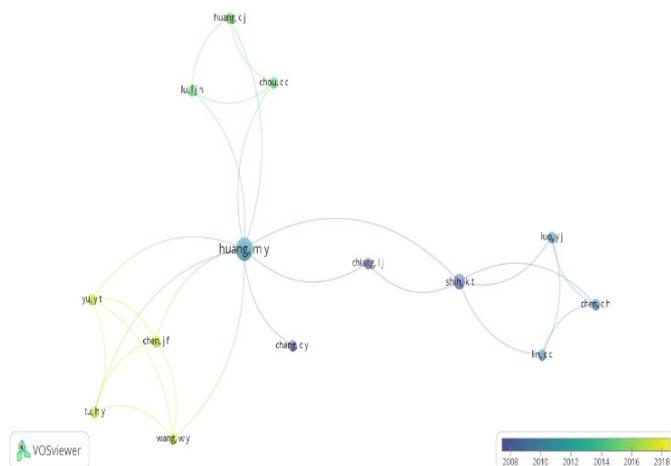


Figure 4: Visualization of overlay Authors and co-authorship relations on the GS database.



Figure 5: Geographical location of contributing authors.

1 article was published on this topic. In addition to the number of articles per publisher, it was also analyzed based on the relevance of the journal. There are 6 major journals that are most relevant to the topic under study (see table 4). In addition, there is also the journal with the most citations, namely the Journal of Physical Education and Sport Pedagogy with 251 citations. This shows that research articles related to critical thinking physical education are scattered in certain journals, although there are also other journals.

Using the VOSviewer software, we can show bibliometric mapping on three different visualizations, network visualization (Figure 1), and overlay visualization (Figure 2), and density visualization (Figure 3). This explanation answers our first research question. Overlay visualization and density visualization analysis were used to identify key themes in each study or the scope of the theme being studied. This result was carried out by measuring the co-occurrence of keyword pairs (Liu et al., 2015; Wu et al., 2021). In addition, VOSviewer can classify keywords into different clusters as shown in (table 5). By extracting based on titles, keywords, and abstracts, with the calculation

of occurrences set to 8 (eight) found as many as 1790 terms (terms) and 49 items that meet the criteria and produce 5 clusters. The keywords in each cluster represent the sequence of studies in the CT-PE. Detailed information is presented in Table 5. Each cluster shows a trend in studies related to "critical thinking physical education" which can be represented through the emergence of certain terms (Setyaningsih et al., 2018). These data allow this paper to answer the second question, how is the trend of CT-PE research. Keywords such as 'critical thinking', 'student', 'teacher' and 'physical education' were the most common; while 'disposition', 'gender', 'creative thinking' and 'culture intelligence' are some of the words that are rarely used and can be examined in future research. Various topics can be developed based on these keywords.

Network analysis also allows identification of the authors' involvement in this research area and how the authors collaborate (Supriadi et al., 2022). Co-author analysis is a widely used bibliometric research technique that investigates co-authors conducting research from a particular field (Ding, 2011; Hudha et al., 2020). The density of writers who contribute to articles on critical thinking physical education is in East Asia. The geographical distribution and collaboration of these authors (see Figures 4 & 5) shows that research on critical thinking physical education is still dominated by the Asian region, especially Taiwan and there is not much collaboration among other countries. Meanwhile, collaboration between authors increases the knowledge base of abilities, publication productivity, and the quality of research produced (Beaver, 2001; Bozeman et al., 2013). These data allow this paper to answer the third question regarding who the dominant author actor in this field of research is. Huang is the author with the largest number of articles and research networks. Based on the data shown (table 6) it also shows that writers from Taiwan dominate the field of research related to critical thinking physical education.

Conclusion

This study reviews a journal article whose theme is related to the keyword "critical thinking physical education". Articles were collected from the GS database by PoP software. Then these 91 articles were selected which were published in the period 2000 to 2021. To fulfill the purpose of this study, all articles found were classified by author, year of publication, name of publisher journal, citation, author and co-authorship relationship and country statistics based on academic affiliation. In the context of this research, it is concluded that the gaps in this research indicate the direction of the future agenda that critical thinking in physical education is very important to study. Overall, from year to year, learning the concept of critical thinking physical education tends to increase. It also requires more research on CT-PE related to gender, creative thinking, and culture intelligence. It is also necessary for more inter-regional research collaboration involving researchers from Asia and other developing countries in certain areas.

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