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Global Trends of the Teacher Knowledge of Physical Education: A Bibliometric Analysis
Tendencias Globales del Conocimiento Docente de Educación Física: Un Análisis Bibliométrico

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Abstract. Background: Physical Education is an important subject in the formal education curriculum in Malaysia also the development of teacher professionalism to face the 21st century education. The bibliometric methods can help researchers and educators understand the important of the research. Purpose: The purpose of this study was to explore the bibliometric characteristics of motivation in the field of Physical Education from 1989 to 2021 that try to discover the related research context and topics. Methods: By using the keywords "physical education" and "teacher knowledge", the bibliographic records and references have been retrieved from the Scopus databases (date of search: July 15, 2022). The data was analysed using Microsoft Excel for frequency analysis, VOSviewer for data visualisation, and Harzing's Publish or Perish for citation metrics and analysis. Bibliometrics' large picture is also provided. Finding: This study analysed the progression of teacher expertise in physical education research, based on source title, country, and institution, and the publication's citation pattern. This document recognises notable researchers. The data show that physical education teacher knowledge has been extensively distributed and has had a significant influence, since the number of publications outside of Europe, in North America and Asia, has grown. Practical implications: The paper will identify the leading trends in the journal in terms of papers, authors, institutions, countries, journals and keywords. This study is useful for obtaining a quick snapshot of what is happening in the journal. Conclusion/ Significant of Study: The findings of this study contribute to our understanding of the global landscape of research on physical education teacher knowledge.
Keywords: physical education, PE, teacher knowledge, bibliometric analysis

Resumen. Antecedentes: la educación física es un tema importante en el plan de estudios de la educación formal en Malasia, así como el desarrollo del profesionalismo docente para enfrentar la educación del siglo XXI. Los métodos bibliométricos pueden ayudar a los investigadores y educadores a comprender la importancia de la investigación. Propósito: El propósito de este estudio fue explorar las características bibliométricas de la motivación en el campo de la Educación Física desde 1989 hasta 2021 que intentan descubrir el contexto y los temas de investigación relacionados. Métodos: Mediante el uso de las palabras clave "educación física" y "conocimiento del docente", los registros bibliográficos y las referencias se han recuperado de las bases de datos Scopus (fecha de búsqueda: 15 de julio de 2022). Los datos se analizaron con Microsoft Excel para el análisis de frecuencia, VOSviewer para la visualización de datos y Harzing's Publish or Perish para las métricas y el análisis de citas. También se proporciona el panorama general de la bibliometría. Hallazgo: Este estudio analizó la progresión de la experiencia docente en la investigación de educación física, según el título de la fuente, el país y la institución, y el patrón de citas de la publicación. Este documento reconoce a investigadores destacados. Los datos muestran que el conocimiento de los profesores de educación física se ha distribuido ampliamente y ha tenido una influencia significativa, ya que ha crecido el número de publicaciones fuera de Europa, en América del Norte y Asia. Implicaciones prácticas: El documento identificará las principales tendencias en la revista en términos de artículos, autores, instituciones, países, revistas y palabras clave. Este estudio es útil para obtener una instantánea rápida de lo que está sucediendo en la revista. Conclusión/ Importancia del estudio: Los hallazgos de este estudio contribuyen a nuestra comprensión del panorama global de la investigación sobre el conocimiento del profesorado de educación física.
Palabras clave: educación física, EF, conocimiento docente, análisis bibliométrico

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Introduction

Education is a crucial factor in the development of a generation that can contribute to a country's success and is considered the foundation of a strong nation (Samruhaizad & Azahan, 2017; Wang et al., 2021). To aligns with Sustainable Development Goals (SDGs) 4: Quality Education, which aims to provide inclusive and equitable quality education and promote lifelong learning opportunities for all (UNESCO, 2017). Each country is responsible for ensuring that this agenda is achieved so that all countries are more equal in the context of sustainable development. Malaysian education is based on the Malaysian National Education Philosophy, which aims to continue to strive to shape individual potential in an integrated and equal manner in order to produce people who are harmonious in terms of spirituality, intellect, body and emotions based on obedience and trust in God. Malaysian education, which is based on faith and obedience to God, strives to continue to develop individual potential in a fair and integrated way to build balanced and harmonious people in terms of intellectual, spiritual, emotional, and physical development. This is an attempt to produce Malaysians who are skilled, knowledgeable, of noble character, responsible for achieving personal well-being while contributing to the future prosperity and security of the community, family and country (Jemaah Nazir, 2019). To fulfill the Malaysian National Education Philosophy's aim, all education subjects must prioritize including physical education. This will promote holistic development, produce harmonious individuals with spiritual, intellectual, physical, and emotional balance, and contribute to overall well-being.

Physical Education is an important subject in the formal education curriculum in Malaysia (Wee et al., 2021; Yakub et al., 2019; Zulkifli & Danis, 2021) and is

recognized as one of the important activities to develop active and healthy habits for child development (Hung et al., 2018). The learning goals of Physical Education are designed to promote individual growth and development, which can contribute to the creation of a healthy, prosperous, and productive society (Espinosa et al., 2017; Sierra-Díaz et al., 2019). While at school, it is only during Physical Education subjects that students can do physical activities such as exercise, so it is very appropriate that all parties step up to help increase students' interest in participating in Physical Education activities. Physical Education subjects are also designed to instill self-confidence Wainwright et al. (2018), help students understand the importance of rules and adhere to them as a way of promoting discipline and teamwork Rijal (2016), improve skills (Barker et al., 2021) and foster a spirit of cooperation among students (Jung et al., 2016). Physical Education also plays an important role in providing healthy and fit students to be able to fully focus during teaching and learning sessions in the classroom (Ramos-Perez et al., 2021).

During the teaching and learning process, the major responsibility of the teacher is to facilitate each student in improving their performance in the lesson. Teachers should organize and implement the teaching and learning process in a more efficient and organized manner (KPM, 2019). As a result, to promote successful learning, teachers must be creative and intelligent Moy et al., (2016) in the selection and preparation of teaching and learning techniques inside and outside the classroom. By doing so, teachers can effectively engage students in Physical Education and help them develop the necessary skills and knowledge for a healthy and active lifestyle. A quality teaching method can certainly encourage students to follow the teaching and gain knowledge and abilities (Almonacid-Fierro et al., 2019), as well as develop a deeper interest among the students (Alfrey et al., 2012). A teacher of Physical Education subjects must understand, and be able to explain and interpret Standard Documents and Curriculum and Assessment (DSKP), Syllabus (SP), Curriculum Standard Document (DSK), Syllabus Description (HSP), and assessment from subjects the latest Physical Education. Teachers who have knowledge, understanding, and the ability to interpret can adapt support to the needs of students with various levels of acceptance of teaching and learning sessions.

The Malaysian government, through the Malaysian Ministry of Education (KPM), is important to provide educational opportunities to generate high quality human capital in the long term, and it should start as early as childhood (Jack et al., 2021; Pastor-Vicedo et al., 2020). The Malaysian Ministry of Education provides facilities and infrastructure to schools to ensure that each teaching and learning session can be handled more effectively. In addition, the policy agenda is explained in the Malaysian Education Development Plan 2013-2025, which is the national education policy by prioritizing the development of quality and excellent teaching staff. This situation is clearly stated in the primary aim of the Malaysian Ministry of Education which is to train teachers who are educators and always strive to improve the quality of teachers on a par with other developed countries (KPM, 2013). This shows that the planning and implementation is to improve the education system by empowering teachers with knowledge, bilingual skills, thinking skills, leadership abilities, spiritual ethics, national identity, and the ability to contribute to individuals, communities, families, as well as national happiness.

But from the previous studies Physical Education isn't emphasised in schools because teachers lack knowledge and abilities in conduction Physical Education in class (Ling & Hian, 2021). Accountability of teachers of physical education and proficiency in the topics they teach are also becoming concerns that are not commonly represented in schools around the nation in this day and age (Yakub et al., 2019). Due to the perception that non-core subjects like Physical Education are less important, teachers may neglect to give them the same level of attention and effort as they would with other subjects. The lack of emphasis placed on Physical Education in teacher training programs and the education system as a whole has also been a longstanding issue (Lander et al., 2015). As a result, there is a need for further research in this field to understand the challenges and opportunities for improving the quality of Physical Education in Malaysia.

Therefore, the training policy of the Ministry of Education Malaysia (KPM) aims to provide opportunities for Education Service Officers, especially teachers, to improve their skills, knowledge, and professional values. The KPM's Human Resource Training Development Panel is responsible for planning the direction of training in addition to issuing matching provisions based on career paths and competencies, as well as ensuring that the government's aspirations are met through the National Human Resource Training Policy. The Ministry of Education and Culture is very concerned about improving competence and more robust performance towards the development of teacher professionalism to face the 21st century education. In Malaysia, the improvement of teachers' content knowledge must be viewed as a measurement tool. How teacher content knowledge is prioritised globally. There are few studies on the Teacher Knowledge in Physical Education research pattern and trend, despite the fact that research in these areas is well-established. Martínez-Bello et al. (2021) stated that there is an urgent need to look into the expansion of to learn about its most recent techniques, which is essential for informing academics about its existence and impact on the world. In fact, this may be achieved by conducting a bibliometric examination of the relevant literature (Arnau-Mollá & Romero-Naranjo, 2022).

The reason bibliometric analysis is so common is that it provides accurate measurement and evaluation of the articles that are indexed in the database that is the subject

of the inquiry de Greeff et al. (2018) and focusing on the years 1989 to 2022. They analysed the data by considering factors such as the number of publications produced each year, the location of the research, highly referenced works, and journals that have the largest total number of publications that are pertinent to the study. Since that time, research on has advanced substantially, and it is essential to remain current with the most recent developments in the relevant body of literature. In order to evaluate the depth and breadth of academic work related to the topic at hand, this study carried out a bibliometric analysis of research that was published between the years 1989 and 2022. It intends to provide answers to the following three primary research questions:

1. How is research evolving and progressing?
- Number of published studies per year
- Sources and document types
- Sources titles
- Language of documents

2. What are the most predominant themes that have been addressed in research?
- Keyword analysis
- Title and abstract analysis

3. Who and what are the leading researchers and institutions in terms of publications on the?
- Publications by countries
- Main institutions
- Authorship analysis
- Citation analysis

The methodology of how the research was divided into many parts below. The next step is a description of the general development and distribution, which includes the identification of the number of studies that are published each year, as well as the sources, document formats, and document languages. The most prevalent topics that the researchers are interested in examining, such as the frequency of keywords and their appearances together, are then brought to the forefront. In the last section, it explores the role that prominent academics and institutions have had in advancing research.

Method

Database selection

Knowledge is disseminated primarily via the publication of articles in academic journals, and the field of bibliometrics is rapidly developing into an increasingly significant part of research methods. Bibliometrics was first described as the application of scientific disciplines, particularly mathematics and statistics, to literary works and other types of media. Bibliometrics allows for the categorization and presentation of a wide variety of data, including but not limited to: unique variables, co-citation links, relevant topics, co-occurrence, and co-authorship; keywords; publication countries/regions; organisations; and the impact of particular articles, journals, and authors (Kumbure et al., 2022). Scopus is a trusted and reliable bibliographic database, offering a comprehensive collection of scientific journals, conference proceedings, and books from various publishers and scholarly societies (Baas et al., 2020). It is one of the largest databases of scholarly literature V. K. Singh et al., (2021), making it a valuable resource Ahmi & Mohd Nasir, (2019) for researchers to conduct bibliometric analyses, evaluate research impact, and access a vast amount of content. Scopus also provides tools for citation analysis, journal metrics, and author profiles.

Inclusion criteria

Throughout the process, we used a keyword to identify the related documents. The terms "Physical Education" AND "Teacher Knowledge" were adopted when searching the Scopus database for information on article titles and abstracts. This search was conducted on 15 July 2022, using a specified document published from 1989 until 2022. The researchers opted to choose articles issued from the first year in Scopus until now to see the development of the research and knowledge production in the field of Physical Education and Teacher Knowledge over time. Consequently, a total of 1188 documents emerged. The documents were further screened, and other unrelated subject areas were excluded such as no abstract and details are not complete, leaving a total 1177 documents retrieved by Scopus. According to the characteristics of our stated objective, we selected a qualitative methodology guided by the Systematic Reviews and Meta-analyses (PRISMA) protocol Moher et al. (2009), on the strategic planning of technology in primary and secondary schools from 1989 to 2022. Shown in Figure 1, what research questions have been formulated to meet the proposed objective from different areas of analysis in terms of research evolving and progressing, most predominant themes, and leading researchers and institutions in publications? In each research que stion, the coding criteria used for the analysis of the articles obtained were identified (Martins et al., 2021).

Data analysis and tools

The Scopus database was used to obtain and evaluate publication year, main source (journal) with impact factor, author's name and affiliation, geographical distribution, document type and language, subject area, and citations. The SCImago Journal Rank (SJR) impact factors (IF) were used to compare the relative prominence of journals within a subject (Valverde-Berrocoso et al., 2020). The h-index was used to measure research paper quality and impact. H-index is based on a document's citations in other publications (P. K. Singh, 2022). Scopus' 'Analyze search results' feature was used to analyse the retrieved data. SPSS 15 (SPSS Inc., Chicago, IL, US) was used to analyse the correlation between published papers and year. By using VOS viewer 1.6.5, it offers a freely available tool for constructing and visualising the networks. VOSviewer

also offers text mining features that can be used to construct and visualise co-occurrence networks of crucial terms extracted from a body of scientific literature (www.vosviewer.com).

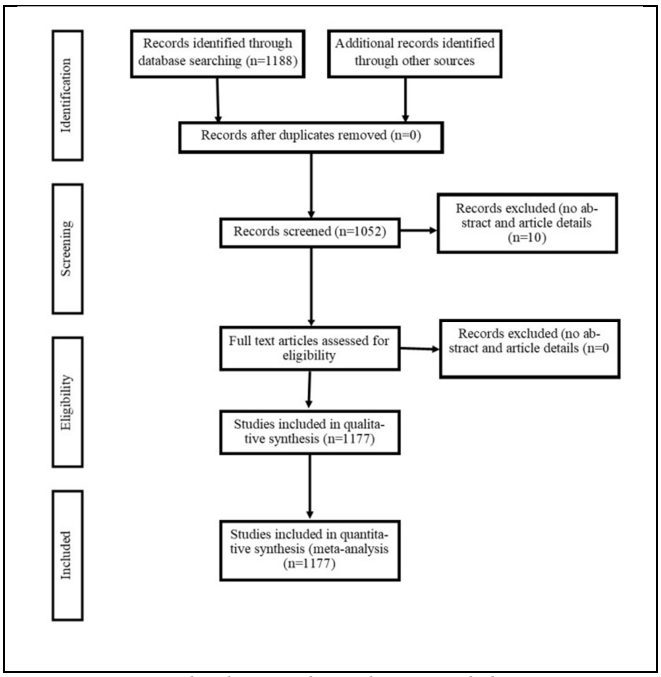

Figure 1 Flowchart according to the PRISMA declaration

Results and Findings

Development and progress of the research

In order to answer the first research question (How is research evolving and progressing?), the development and distribution of the research were discussed in terms of: (a) the number of published studies per year; (b) sources and documents types; (c) sources titles; and (d) languages of documents.

Number of published studies per year

The number of research articles published each year is shown in Table 1, which covers the years 1989 through 2022 and shows a general rising trend in the number of articles published. Year 1989 is the first year that was published and indexed by Scopus, however there was just one document published during that year. Between the years 1989 and 2005, the Scopus database only had a little over twenty relevant publications, with no documents having been published in 1990. The number steadily and consistently minimum 20 publications published each year from 2008 to 2022, demonstrating an increasing interest in TKPE. The number of papers that were generated and published on TKPE rose substantially in the year 2020, with 120 documents being produced during that year.

In addition, as can be seen in Figure 2, the number of citations that were given to documents that were published in the year 2012 appears to have reached its highest point (the total number of citations was 2,333, and the average number of citations per publication was 3.82). After that, the number of citations began to gradually decrease. It's possible that the top 20 papers that were published in Scopus in 2012 were responsible for the significant increase in overall citations that year. On the other hand, the fewest citations were given to papers published in the year 2002. (the total number of citations per publication was 1 and the total number of citations was 12). According to Figure 2, the overall number of publications is growing, while the total number of citations is exhibiting uneven patterns. After the yearly growth document has been identified, the sources for TKPE research, document categories, most active source titles, and language of papers that have been conducted in TKPE publications are explained.

Sources and document types

The published documents that are a part of the data sets have also been analysed according to the document kinds that they include and the source type. Document types refer to the types of documents that are based on the originality of the documents, such as conference proceedings, journal articles, or book series. On the other hand, source types refer to the types of documents that are used as sources, such as journals, conference paper, book chapters, trade publication and books (Kokol et al., 2021). There was a distinction between the conference papers that arose under the document type and those that developed under the source type (Kwon & Choi, 2022). The term "conference paper" is used to describe a piece of writing that has been presented at a conference; however, the paper was most likely first published in the form of a journal article. Although the document type was derived from the conference paper, some of the papers presented at conferences have also been published as book chapters or as parts of conference proceedings under the source type. According to the findings of this research, there are nine different kinds of documents that have been published on TKPE. These categories of documents include journal articles, conference papers, book chapters, notes, reviews, editorials, books, and short surveys. The Scopus doesn't have a definition for one of the publications.

Table 1.
Document by Year

Year	TP	%	NCP	TC	C/P	C/CP	*h*	*g*
2022	82	6.97	17	24	0.29	1.41	2	2
2021	172	14.61	89	274	1.59	3.08	7	10
2020	120	10.20	95	496	4.13	5.22	11	13
2019	93	7.90	79	730	7.85	9.24	15	21
2018	79	6.71	74	885	11.20	11.96	17	23
2017	79	6.71	74	806	10.20	10.89	15	22
2016	62	5.27	56	889	14.34	15.88	18	27
2015	58	4.93	57	1002	17.28	17.58	20	29
2014	56	4.76	55	1263	22.55	22.96	19	34
2013	55	4.67	51	1283	23.33	25.16	17	34
2012	65	5.52	112	2287	35.18	20.42	27	41
2011	45	3.82	94	2333	51.84	24.82	25	44
2010	29	2.46	80	1914	66.00	23.93	23	40
2009	23	1.95	74	2267	98.57	30.64	22	46
2008	20	1.70	71	1937	96.85	27.28	22	41
2007	9	0.76	9	250	27.78	27.78	8	9
2006	22	1.87	22	629	28.59	28.59	16	22
2005	12	1.02	11	588	49.00	53.45	9	11
2004	13	1.10	13	499	38.38	38.38	12	13

Table 1.
Document by Year

Year	TP	%	NCP	TC	C/P	C/CP	*h*	*g*
2003	5	0.42	5	206	41.20	41.20	5	5
2002	10	0.85	10	241	24.10	24.10	9	10
2001	8	0.68	8	343	42.88	42.88	8	8
2000	14	1.19	14	359	25.64	25.64	11	14
1999	5	0.42	5	188	37.60	37.60	5	5
1998	7	0.59	7	422	60.29	60.29	7	7
1997	9	0.76	9	148	16.44	16.44	6	9
1996	4	0.34	4	56	14.00	14.00	4	4
1995	6	0.51	6	267	44.50	44.50	6	6
1994	3	0.25	3	130	43.33	43.33	3	3
1993	3	0.25	3	65	21.67	21.67	3	3
1992	5	0.42	4	122	24.40	30.50	4	4
1991	3	0.25	3	40	13.33	13.33	3	3
1989	1	0.08	1	1	1.00	1.00	1	1

Abbreviations: C/CP, average citations per cited publication; C/P, average citations per publication; g, g-index; h, h-index; NCP, number of cited publications; TC, total citations; TP, total number of publications.

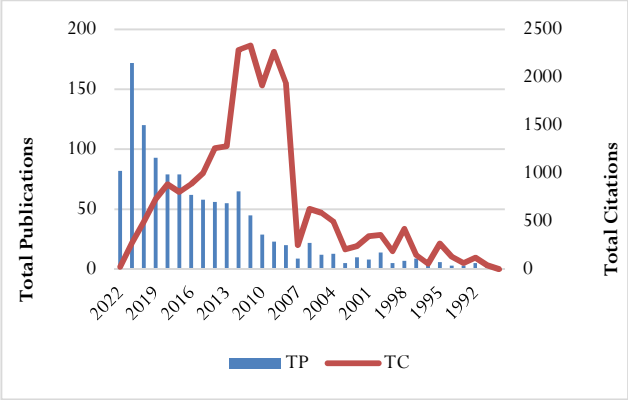

Figure 2 Total publications and citations per year.
Abbreviations: TP, total publications; TC, total citation

Table 2.
Document Type

Document Type	No. of Publications	Percentage (%)
Article	1035	87.94
Review	54	4.59
Book Chapter	52	4.59
Conference Paper	17	1.44
Book	12	1.02
Editorial	3	0.25
Note	2	0.17
Letter	1	0.08
Retracted	1	0.08
Total	1177	100

In addition to that, the data were analysed according to the different types of documents. The search conducted on Scopus was successful in retrieving nine categories of papers that were published on the TKPE. These categories are summarised in Table 2. According to the data shown in the table, the vast majority of the publications take the form of articles (n = 1035, or 87.94%). This was followed by documents that made up less than 10% of the overall publishing, such as reviews (n = 54, 4.59%) and book chapter (n = 52, 4.59%). Each of these categories had a total of less than 10% of the total publication. The other categories of conference paper, book, editorial, notes, letter and retracted accounted for less than 2% of the total number of published works combined.

Sources titles

In the meantime, as shown in Table 3, the documents are separated into four distinct types of sources. Journals are the most prevalent type of source, with 1092 documents accounting for 92.78% of the total publications. Books are the second most prevalent type of source, with 64 documents accounting for 5.44% of the total publications.

Table 3.
Source Type

Source Type	No. of Publications	Percentage (%)
Journal	1092	92.78
Book	64	5.44
Conference Proceeding	15	1.27
Book Series	6	0.51
Total	1177	100

For the Journal Of Teaching In Physical Education contribute the most active source number of publication in "Teacher Knowledge" and "Physical Education" with total publications is 130. Among the articles (Barnett et al., 2016; Hastie & Casey, 2014; Kirk & Macdonald, 1998; Light, 2008). Second is by the European Physical Education Review with 97 publications. This was followed then from the same publisher of Taylor & Francis, four journal which is Physical Education And Sport Pedagogy, Sport Education And Society, Research Quarterly For Exercise And Sport and Quest with publication total up to 247 publications. Table 4 shows the top 15 most active source titles in the "Teacher Knowledge" and "Physical Education". After detecting current trends in source titles, the final characteristic used to determine current trends is the language of documents, which indicates the languages in which "Teacher Knowledge" and "Physical Education" has been identified.

Research articles on TKPE were written in a total of thirteen different languages. According to the findings in Table 5, the language that was used the most was English, which accounted for 87.935% of all TKPE articles. Spanish, which was spoken by 6.24% of the population, was the second most frequent language, and Portuguese, which was spoken by 2.83% of the population, was the third most common language.

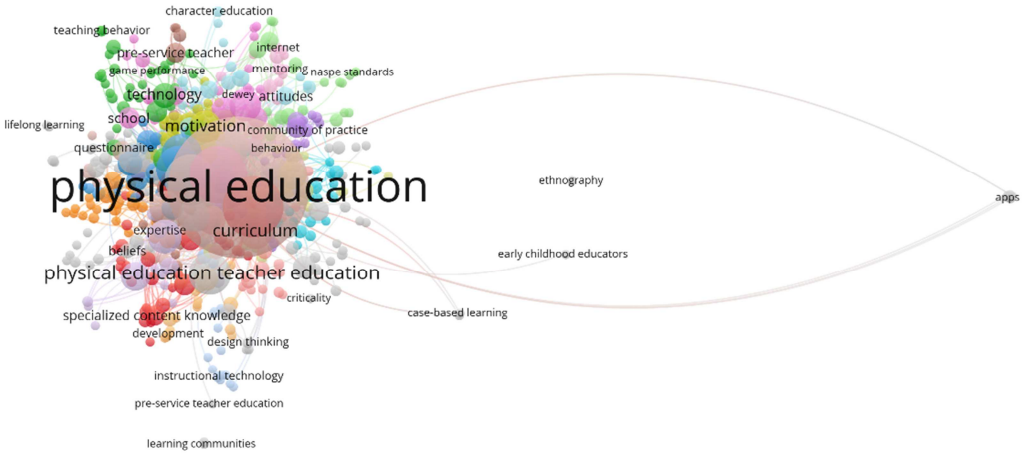

Figure 3 Author keyword

Table 4.
Top 15 most active source titles

Source Title	Publisher	Cite Score	SJR 2021	SNIP 2021	TP	NCP	TC	C/P	C/CP	h	g
Journal of Teaching in Physical Education	Human Kinetics Publishers Inc.	5.3	1.145	1.829	130	121	2880	22.15	23.80	31	47
European Physical Education Review	SAGE	6	1.115	1.929	97	84	1688	17.40	20.10	23	36
Physical Education and Sport Pedagogy	Taylor & Francis	8.3	1.604	2.595	86	72	1533	17.83	21.29	35	15
Sport Education and Society	Taylor & Francis	6.4	1.211	2.053	74	65	1426	19.27	21.94	21	35
Research Quarterly for Exercise and Sport	Taylor & Francis	3.7	0.665	1.069	51	47	1260	24.71	26.81	19	34
Quest	Taylor & Francis	4.9	1.138	1.791	36	34	883	24.53	25.97	18	29
Retos	Federacion Espanola de Docentes de Educacion Fisica	2.4	0.319	0.75	33	31	224	6.79	7.23	8	13
Journal Of Physical Education and Sport	Editura Universitatea din Pitesti	2.2	0.393	0.746	31	27	132	4.26	4.89	7	10
Movimento	Universidade Federal do Rio Grande do Sul	0.7	0.248	0.556	17	11	75	4.41	6.82	5	8
Curriculum Studies in Health and Physical Education	Taylor & Francis	2.9	0.518	0.903	16	10	68	4.25	6.80	4	8
International Journal of Environmental Research and Public Health	Multidisciplinary Digital Publishing Institute (MDPI)	4.5	0.814	1.44	16	12	80	5.00	6.67	6	8
Teaching and Teacher Education	Elsevier	6.2	1.945	2.737	15	14	636	42.40	45.43	11	14
Journal of Physical Education Recreation and Dance	Taylor & Francis	1.7	0.473	0.774	13	9	52	4.00	5.78	4	7
Australian Journal of Teacher Education	School of Education, Edith Cowan University	2.4	0.632	1.195	12	11	175	14.58	15.91	7	11
Sustainability Switzerland	Multidisciplinary Digital Publishing Institute (MDPI)	5	0.664	1.31	11	9	100	9.09	11.11	4	9

Abbreviations: C/CP, average citations per cited publication; C/P, average citations per publication; Cite Score, average citations received per document published in the source title; g, g-index;h, h-index; NCP, number of cited publications; SJR, SCImago Journal Rank measures weighted citations received by the source title; SNIP, source normalised impact per paper measures actual citations received relative to citations expected for the source title's subject field; TC, total citations; TP, total number of publications.

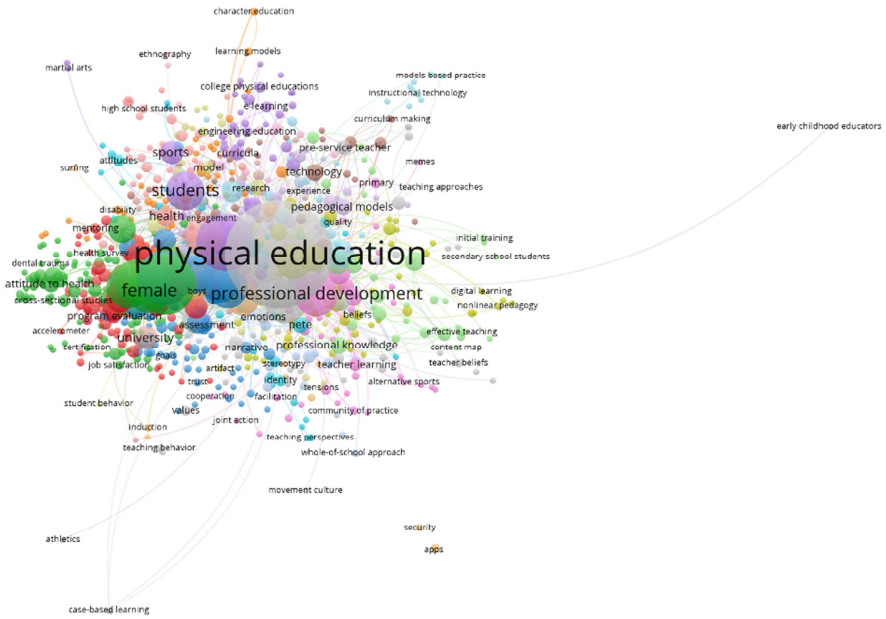

Figure 4. Co-occurrence network based on title and abstract fields

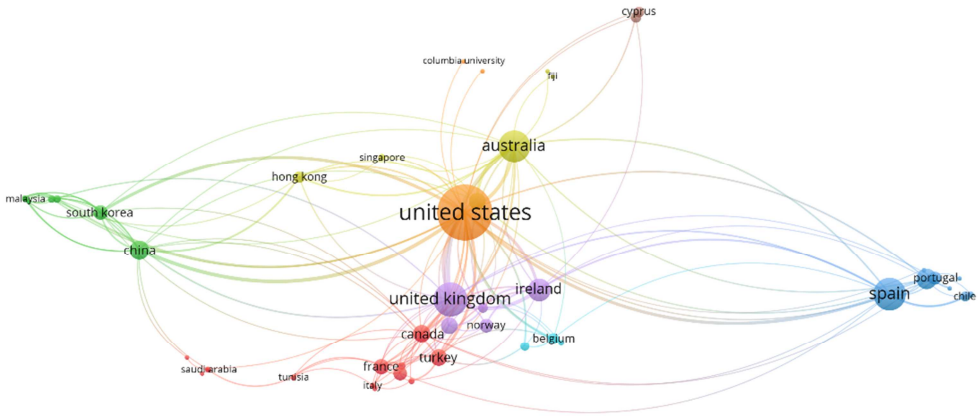

Figure 5 Network visualisation map of the TKPE research co-authors by country

Predominant themes of the TKPE research

The primary aim of the second research question (What are the most predominant themes that have been addressed in TKPE research?) is to identify the main themes of TKPE research. In this section, the key areas of the research were analysed in terms of (a) the frequency of keywords and (b) document titles and abstracts.

Keyword analysis

When doing a search, it is essential to choose relevant keywords to use in order to determine whether or not a document will be located. As a result, the frequency with which relevant terms are selected might serve as a measure of the worth of writing. A network visualisation of the author's keywords is shown in Figure 3. Each of these terms appeared at least three times throughout the text. According to Schöggl et al. (2020), two keywords are considered to co-occur when they are included in the same article. This suggests that there is a connection between the two subjects.

The keyword and co-occurrence analysis features of VOSviewer were put to use so that we could answer the second study question. In order to map the keywords that were associated with each article, the authors performed an analysis of the keywords using a programme called VOSviewer, which is a tool for constructing and visualising bibliometric networks (Figure 4). Relationships with other terms are shown by their respective colours, circle sizes, letter sizes, and the thickness of connecting lines (Ahmi & Mohd Nasir, 2019). Keywords that have a high frequency of being assigned to the same shade are usually categorised together. The results of the analysis led to the development of 14 groups, each including 166 items from the TKPE study. These clusters were based on the author's keywords. For future researcher can use this bibliometric analysis to explore more about Physical Education with other area such as research about ethnography, early childhood educator, case-based learning and apps in Figure 3.

Table 5.
Languages used for TKPE research publications

Language	No. of Publications	Percentage (%)
English	1050	87.35
Spanish	75	6.24
Portuguese	34	2.83
French	15	1.25
German	10	0.83
Turkish	6	0.50
Croatian	4	0.33
Chinese	2	0.17
Czech	2	0.17
Arabic	1	0.08
Korean	1	0.08
Norwegian	1	0.08
Russian	1	0.08

The core keywords specified in the search query (i.e., Physical Education AND Teacher Knowledge), Physical Education, Teacher, Teaching and Article are among the most frequently occurring keywords with more than 7%. The top 20 keywords in the TKPE research are shown in Table 6.

Table 6.
Top 20 keywords in TKPE research

Author Keywords	Total Publication	Percentage (%)
Physical Education	527	44.77
Teacher	168	14.27
Teaching	147	12.49
Article	134	11.38
Humans	90	7.65
Physical Education and Training	88	7.48
Professional Development	84	7.14
Female	83	7.05
Male	81	6.88
Teacher Education	78	6.63
Physical Activity	76	6.46
Learning	68	5.78
Students	66	5.61
Human	61	5.18
Teacher Training	59	5.01
Student	57	4.84
Education	52	4.42
Sport	51	4.33
Curriculum	50	4.25
Physical Education Teacher Education	39	3.31

Title and abstract analysis

In this part of the review, VOSviewer was used to search the titles and abstracts of the obtained documents for instances of occurrences as well as the number of co-occurrences in each document. To be more specific, the co-occurrence network is built by the use of the binary counting approach in this study. At least 15 different phrases are represented in the visualisation of a term co-occurrence network that can be seen in Figure 4, which is dependent on the title and abstract fields. The breadth of the node provides an indication of the item's weight, while the thickness of the connecting line provides an indication of the item's level of involvement in the connection. When words that are associated with one another are shown in the same colour, it increases the likelihood that they will occur together (Ahmi & Mohd Nasir, 2019). The phrases "framework," "efficacy," "competency," "content," "perspective," "policy," and "implementation," to name a few, appear in red to indicate that they are strongly connected to one another and commonly appear in the diagram at the same time. To be more specific, VOSviewer creates four unique colours based on the publication's title and abstract, each of which represents a cluster comprising 221 phrases.

The structure of a network that is based on the co-occurrence of terms in titles is shown in Figure 5. A binary counting approach was used, and there had to be at least five instances of each sentence for the count to be valid. According to the collected data, the VOSviewer produces a total of 92 elements and seven distinct clusters. The word "Physical Education" was the fundamental term that was used throughout the TKPE study and functioned as the central node of the whole network. After the examination of the keywords, the next part will talk about the significant actors and the research cooperation. In addition, citation analysis was carried out in order to get a deeper comprehension of the problems that are now being faced and to illustrate the breadth of an article's influence. Citation analysis is by far the most used approach to determining the significance of research publications, despite the fact that there are a number of other ways to do it as well (P. K. Singh, 2022).

Major players and research collaboration

This section examines the third research question, which is to evaluate scientific cooperation on TKPE research through (a) an analysis of publications by country, (b) the most active institutions engaging in CFER research, (c) authorship analysis, and (d) citation analysis.

Publication by countries/countries with most contributions

The reported metrics for the top 20 countries in terms of TKPE research are summarised in Table 7, which follows. There are a total of 65 nations included in the Scopus database under the TKPE keyword umbrella. After the United Kingdom (with 144 documents), Spain (with 136 documents), and Australia (with 128 documents), the United States of

America has the most scientific articles in the TKPE study area with 377 documents. The national associations of the remaining writers accounted for less than 70 publications and were located in a variety of countries throughout the globe, such as Ireland, Brazil, China, Canada, Turkey, and New Zealand. Countries mentioned include: Sweden, France, South Korea, Germany, Norway, Belgium, and Hong Kong.

As illustrated in Figure 6, in terms of total citations, United States still the highest citation count (n = 7120). The United Kingdom is second (n = 3236). Australia is in fourth rank on citation count Publications in Ireland, specifically Brazil and Asia, remained low, with all of them falling below the 20 total publications.

Main institutions

In this part, an examination of the present state of affairs at the most prominent TKPE research organisations is presented. Table 8 displays the total number of publications produced by the top 15 universities worldwide in terms of research output with a minimum of five publications . The Ohio State University was ranked first when it came to the number of publications it produced, and it was followed by the University of Limerick. Three universities, including Auburn University, the University of Birmingham, and The University of Queensland, produced the same number of publications.

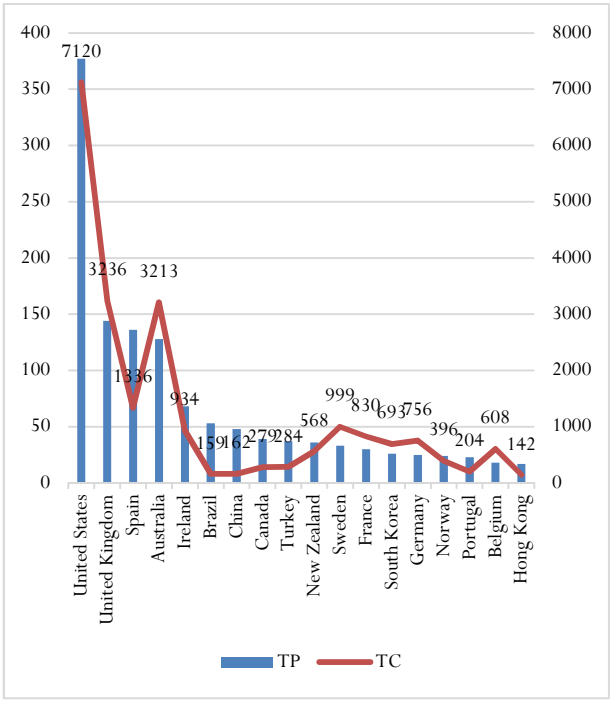

Figure 6. Total publications and citations based on geographical location

Table 7.
Geographic origins of the TKPE research

Country	TP	NCP	TC	C/P	C/CP	h	g	Continent
United States	377	331	7120	18.89	21.51	43	63	North America
United Kingdom	144	127	3236	22.47	25.48	28	51	Europe
Spain	136	110	1336	9.82	12.15	19	30	Europe
Australia	128	114	3213	25.10	28.18	30	52	Oceania
Ireland	68	60	934	13.74	15.57	18	28	Europe
Brazil	53	34	159	3.00	4.68	8	10	South America
China	48	24	162	3.38	6.75	8	11	Asia
Canada	39	31	279	7.15	9.00	11	15	North America
Turkey	37	32	284	7.68	8.88	10	15	Europe
New Zealand	36	31	568	15.78	18.32	14	23	Oceania
Sweden	33	61	999	30.27	16.38	18	28	Europe
France	30	54	830	27.67	15.37	16	26	Europe
South Korea	26	48	693	26.65	14.44	15	24	Asia
Germany	25	52	756	30.24	14.54	15	26	Europe
Norway	24	19	396	16.50	20.84	10	19	Europe
Portugal	23	20	204	8.87	10.20	8	13	Europe
Belgium	18	15	608	33.78	40.53	11	15	Europe
Hong Kong	17	14	142	8.35	10.14	7	11	Asia

Abbreviations: C/CP, average citations per cited publication; C/P, average citations per publication; g, g-index; h, h index; NCP, number of cited publications; TC, total citations; TP, total number of publications.

Table 8.
Most active institutions with a minimum of five publications

Institution	Country	TP	NCP	TC	C/P	C/CP	h	g
The Ohio State University	United States	52	47	1048	20.15	22.30	20	31
University of Limerick	Ireland	50	43	762	15.24	17.72	16	26
Auburn University	United States	30	26	810	27.00	31.15	13	26
University of Birmingham	United Kingdom	30	27	389	12.97	14.41	14	19
The University of Queensland	Australia	30	25	966	32.20	38.64	14	25
University of Illinois Urbana-Champaign	United States	28	26	439	15.68	16.88	11	20
The University of Alabama	United States	27	25	777	28.78	31.08	15	25
Universidad de Castilla-La Mancha	Spain	26	21	294	11.31	14.00	9	17
Kent State University	United States	25	20	464	18.56	23.20	11	20
Wayne State University	United States	23	23	660	28.70	28.70	17	23
West Virginia University	United States	23	18	647	28.13	35.94	14	18
Loughborough University	United Kingdom	20	17	381	19.05	22.41	10	17
The University of Auckland	United Kingdom	19	14	172	9.05	12.29	8	13
Universidad de Granada	Spain	19	11	60	3.16	5.45	4	7
Universidade Federal de Santa Catarina	Brazil	18	14	190	10.56	13.57	8	13

Abbreviations: C/CP, average citations per cited publication; C/P, average citations per publication; g, g-index; h, h-index; NCP, number of cited publications; TC, total citations; TP, total number of publications.

Authorship analysis

The contributions that 20 prominent authors have made to TKPE research are shown in Table 9. Ward, P from East China Normal University in Shanghai, China, Hastie, P.A. from Auburn University in Auburn, MacPhail, A. from University of Limerick, Limerick in Limerick, and Richards, K.A.R from University of Illinois Urbana-Champaign in Urbana, United States, each have a total of four publications to their name. Richards comes from the University of Illinois Urbana-Champaign in Urbana, United States. The VOSviewer programme is used for co-author analysis in this study. This allows for a more thorough examination of the authors' collaborative efforts, as well as the production of a network visualisation (Figure 7). The study is based on the fact that prominent authors have been acknowledged at least once in one TKPE article, and the results are determined using the fractional counting approach. The direction of the writers' relationship is strengthened by certain qualities like colour, circle size, text size, and thickness. It is common practise to list associated writers in the order in which they were published, as indicated by the usage of the same colour. The figure, for example, suggests that Kirk D., Lonsdale C., Hastie P.A, and Casey A, worked closely together. According to the findings, Hastie P.A (Auburn University, United States) actively collobrate with colleagues from University which is Catholic University of Murcia, Spain, Regional Ministry of Education, Region of Murcia, Spain and University of Queensland, Australia.

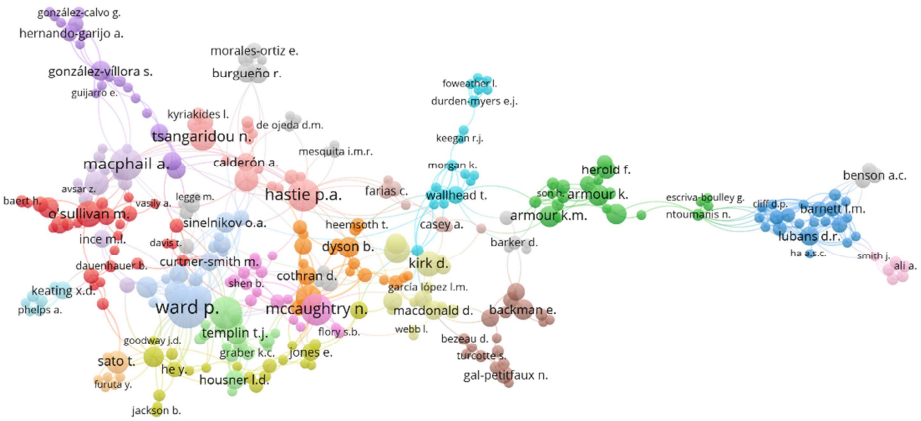

Figure 7. Network visualisation map of the TKPE research co-authors

Table 9.
Most active authors with a minimum of five publications

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	*h*	*g*
Ward, P.	East China Normal University, Shanghai	China	32	28	591	18.47	21.11	13	24
Hastie, P.A.	Auburn University, Auburn	United States	20	25	803	40.15	32.12	13	25
MacPhail, A.	University of Limerick, Limerick	Ireland	20	19	350	17.50	18.42	11	18
Richards, K.A.R.	University of Illinois Urbana-Champaign, Urbana	United States	20	19	266	13.30	14.00	9	16
McCaughtry, N.	Wayne State University, Detroit	United States	19	19	595	31.32	31.32	16	19
Tsangaridou, N.	University of Cyprus, Nicosia	Cyprus	14	12	223	15.93	18.58	8	12
Kirk, D.	University of Strathclyde, Glasgow	United Kingdom	13	11	840	64.62	76.36	7	11
Kulinna, P.H.	Arizona State University Polytechnic Campus, Mesa,	United States	13	12	235	18.08	19.58	9	12
O'Sullivan, M.	University of Limerick, Limerick	Ireland	13	12	290	22.31	24.17	10	12
Rovegno, I.	The University of Alabama, Tuscaloosa	United States	13	13	412	31.69	31.69	10	13
Kim, I.	Kent State University, Kent	United States	12	8	199	16.58	24.88	7	8
Hastie, P.			11			0.00			
Tannehill, D.	University of Limerick, Limerick	Ireland	11	10	167	15.18	16.70	7	10
Sato, T.	University of Tsukuba, Tsukuba	Japan	10	7	53	5.30	7.57	4	7
Armour, K.	University of Birmingham, Birmingham,	United Kingdom	9	18	395	43.89	21.94	11	18
Armour, K.M.			9			0.00			
Dervent, F.	Marmara Üniversitesi, Istanbul,	Turkey	9	7	78	8.67	11.14	5	7
Dyson, B.	The University of North Carolina at Greensboro, Greensboro	United States	9	6	68	7.56	11.33	4	6
Templin, T.J.	University of Michigan, Ann Arbor, Ann Arbor	United States	9	9	241	26.78	26.78	7	9
Backman, E.	Högskolan Dalarna, Falun	Sweden	8	8	80	10.00	10.00	5	8

Abbreviations: C/CP, average citations per cited publication; C/P, average citations per publication; g, g-index; h, h-index; NCP, number of cited publications; TC, total citations; TP, total number of publications.

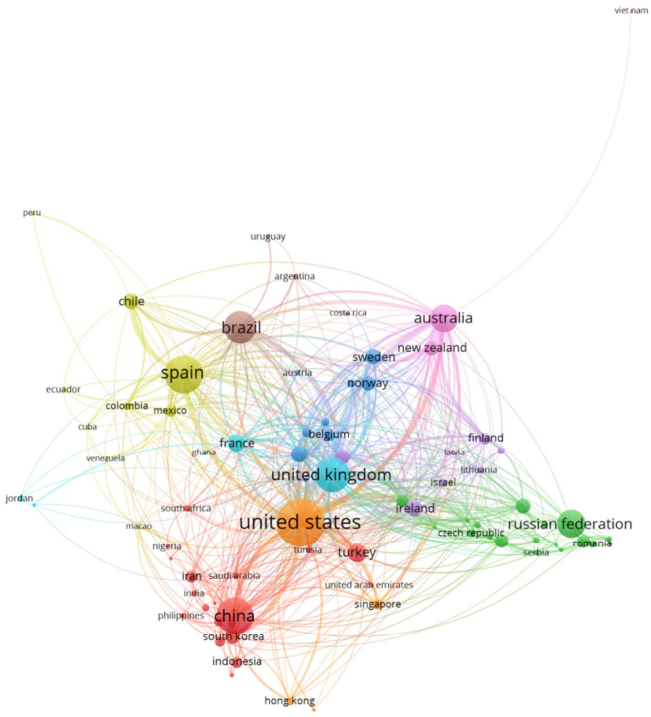

Figure 8. Network visualisation map of the TKPE research co-authors by country

The network visualisation map of the author's associated country is shown in Figure 5. Only those nations that have referenced more than one publication and more than one citation were taken into consideration for this study. The data suggest that the United States plays a major part in international cooperation than the United States, based on the fractional counting approach, which suggests that the United States plays a large role. The relationship between Spain and both Australia and Brazil is quite close. Lastly, the third research question brought attention to the problem of citation analysis, which displays the total number of TKPE research citations in the field of Physical Education.

Citation analysis

A summary of TKPE research citations from the Scopus database is shown in Table 10. For 1177 papers published over 33 years (1989-2022), a total 16715 citations were recorded, representing an estimate of 506.52 citations per year on average. Table 10 TKPE research citations metrics.

Table 10.
TKPE research citations metrics

Metric	Data
Total papers	1177
Total citations	16715
Number of years	33
Citations per year	506.52
Citations per paper	14.07
Authors per paper	1.95
h-index	2.98
g-index	82

Table 11 summarises the 15 most often cited publications on TKPE research, ranked by the number of times each document was cited Kirk D.authored the most cited document with 435 citations from a article on Physical Education Futures (2010). The second publications by authors Lonsdale C., Rosenkranz R.R., Peralta L.R, published in 2013, are research articles on A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school PE lessons with 267 citations. Third publication is Day C., Elliot B., Kinton A total cited 255 in 2005, from a article on Reform, standards and teacher identity: Challenges of sustaining commitment.

Figure 8 displays the network visualisation map of the author's affiliated nation. Only countries that have cited more than one article and more than one citation are included in the analysis. Based on the fractional counting method, the findings imply that United States plays a significant role in international collaboration. The United Kingdom has a tight connection with Spain, Brazil and Australia in scientific research. Apart from that, this finding also be seen the country of Vietnam starts affiliated with Australia in scientific research, as shown in the network visualisation map. This suggests that Vietnam is increasingly recognising the importance of international collaboration in advancing knowledge and addressing global challenges.

The additional information on the countries of origin is shown in Figure 9. Countries that have been referenced in a minimum of five papers, with each nation receiving a minimum of five citations, are considered for inclusion in the study. It would seem at this moment that the United States of America, the United Kingdom, Ireland, and Australia are the nations that have the greatest effect over TKPE research.

Table 11.
Most cited publications

Authors	Year	Title	Source title	TC	CPY
Kirk D.	2010	Physical Education Futures	Physical Education Futures	435	33.46
Lonsdale C., Rosenkranz R.R., Peralta L.R.	2013	A systematic review and meta-analysis of interventions designed to increase moderate-to-vigorous physical activity in school PE lessons	Preventive Medicine	267	29.67
Day C., Elliot B., Kinton A.	2005	Reform, standards and teacher identity: Challenges of sustaining commitment	Teaching and Teacher Education	255	15.00
Kirk D., Macdonald D.	1998	Situated learning in physical education	Journal of Teaching in Physical Education	232	9.67
Hastie P.A., de Ojeda D.M., Calderón A.	2011	A review of research on sport education: 2004 to the present	Physical Education and Sport Pedagogy	185	16.82
Tinning R.	2009	Pedagogy and human movement: Theory, practice, research	Pedagogy and Human Movement: Theory, Practice, Research	165	12.69
Hastie P.A., Casey A.	2014	Fidelity in models-based practice research in sport pedagogy: A guide for future investigations	Journal of Teaching in Physical Education	147	18.38
Morley D., Bailey R., Tan J., Cooke B.	2005	Inclusive Physical Education: Teachers' views of including pupils with Special Educational Needs and/or disabilities in Physical Education	European Physical Education Review	147	8.65
Curtner-Smith M.D.	2001	The Occupational Socialization of a First-Year Physical Education Teacher with a Teaching Orientation	Sport, Education and Society	143	6.81
Barnett L.M., Stodden D., Cohen K.E., Smith J.J.	2016	Fundamental movement skills: An important focus	Journal of Teaching in Physical Education	138	23.00
Casey A.	2014	Models-based practice: Great white hope or white elephant?	Physical Education and Sport Pedagogy	119	14.88
Aelterman N., Vansteenkiste M., van den Berghe L.	2014	Fostering a need-supportive teaching style: Intervention effects on physical education teachers' beliefs and teaching behaviors	Journal of Sport and Exercise Psychology	118	14.75
Light R.	2008	Complex learning theory-its epistemology and its assumptions about learning: Implications for physical education	Journal of Teaching in Physical Education	115	8.21
De Meyer J., Speleers L., Tallir I.B., Soenens B.,	2014	Does observed controlling teaching behavior relate to students' motivation in physical education?	Journal of Educational Psychology	113	14.13
Green K.	2008	Understanding physical education	Understanding Physical Education	112	8.00

Abbreviations:CYP, citations per year; TC, total citations

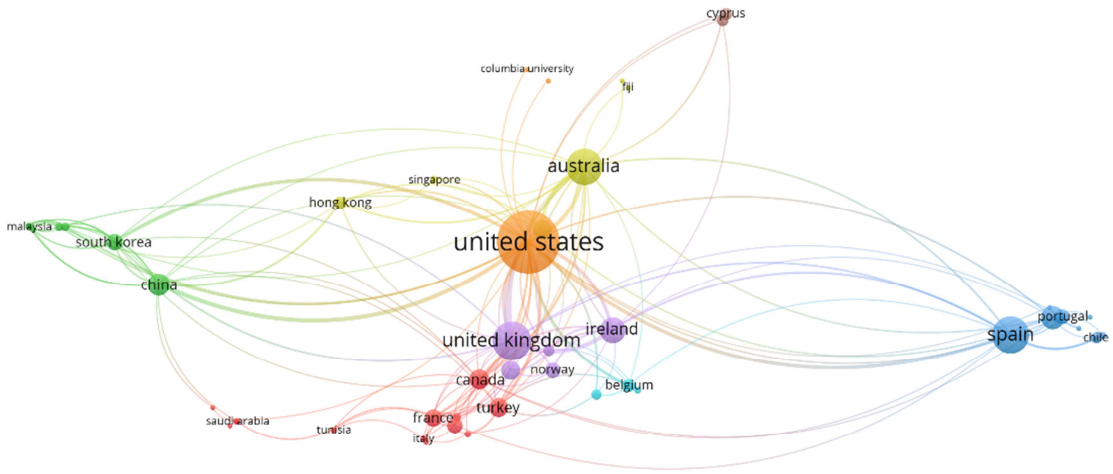

Figure 9. Network visualisation map of citations of the TKPE documents by country

Discussion

Using bibliometric analysis, the purpose of this study is to investigate the current state of research concerning TKPE. It is possible to measure the productivity of research and publications in a particular study subject by using this bibliometric approach, which was developed by Kokol et al. (2021). According to Baas et al. (2020), the information that is provided by the bibliometric data can be used to evaluate the performance of a specific research domain. Additionally, the information provided by the bibliometric data can be beneficial for research-related agencies to regulate some of the policies related to the allocation of funding and compare the scientific input and output. In addition, the findings of the bibliometric study may shed light on the elements that contribute to the significance of the studies carried out in a particular research field and direct academics in the direction of creating studies that have a significant influence (Wang et al., 2021). According to the papers that were obtained from the Scopus database, the two strengths that were discussed earlier are examples of the differences that exist between the two approaches to Physical Education and Teacher Knowledge.

Concerns have been expressed however, about the scope of the TKPE study as well as the collaborative nature of the work being done in many parts of the globe. In order to find a solution to this issue, we carried out a bibliometric study that spanned 33 years and included 1177 pieces of TKPE literature that were published in Scopus (from 1989 to 25 July 2022). The purpose of this investigation is to find answers to the following three research questions: (1) how is TKPE research evolving and progressing; (2) what are the most predominant themes that have been addressed in TKPE research; and (3) who and what are the leading researchers and institutions in terms of publications on the TKPE The responses to these questions were analysed using a variety of different central concepts. The results of this study, in answer to the first research question concerning the development and progression of TKPE, demonstrated that publications on the TKPE started in 1989 with a single document and have been expanding every year since then.

When compared to the other sorts of papers, journal articles accounted for more than 90 percent of the total number of documents. The majority of the publications were published in English, and their authors came from at least 65 different nations. Two of the most important nations that contributed to the publishing of TKPE were the United States and the United Kingdom. The findings of research conducted on TKPE are often published in academic journals that fall within the subject area of Education and the Social Sciences. Due to the fact that TKPE is a topic area that spans several disciplines, other publications still include TKPE. The findings obtained through VOSviewer's keyword analysis, as well as its title and abstract analysis, provide evidence of the area's primary emphasis, as can be seen above. For instance, the terms "Physical Education" and "teacher" are the most often occurring search terms that were discovered in the collected papers. The most commonly occurring term in the retrieved publications was "Physical Education," indicating that this topic continues to be an important area of research in the field (Wright & Grenier, 2019). This may be of use to other researchers in identifying whether or not the keyword is widespread in the TKPE study, which correlates to the degree to which this subject is common in the TKPE domain.

The citation measure that is revealed in this research provides insight into the influence that publications have had on TKPE. In the 33 years of publishing that span from 1989 to 2022, a total of 1177 papers have been published, and these documents have been cited 22,944 times in total. Documents retrieved from the Scopus database on TKPE show an average of 14.04 authors per publication, 500.88 citations per paper year, and 16529 citations per year overall. In this examination, more research finds that Ward, P. from East China Normal University in Shanghai,

China has the highest overall citation count with 28 and the most total publications with 32.

Despite the fact that the bibliometric analysis is rather detailed, the study does have certain limitations that need to be addressed in order to provide readers of the publication with a clear understanding as well as to enhance the quality of future research. First, the results only appeared after using the precise keyword, which was "TKPE" or "Physical teacher and Teacher Knowledge" according to the title of the paper. This was the case throughout the whole search process. This means that the outcomes of the search query on other fields, such as abstract and keyword, have not been included into the analysis in any way. The primary reason for this is because the vast majority of studies that concentrate on a certain subject will almost always include it in the titles of the papers they produce. Even though some people definitely included the phrase that was relevant to the search query in the abstract or the keyword field, the main emphasis of their study probably wasn't on anything that was particularly relevant to what the researcher is searching for. Because of this, there is a significant amount of filtering and cleaning work that has to be done before the analysis can be carried out. It is likely that this topic will be covered in more study in the future.

The limited amount of research on teacher knowledge in physical education (TKPE) in Malaysia, as highlighted in the bibliometric study, indicates the need for more attention and resources to be directed towards this area of research. This is especially important for the Malaysian education system, where education service officers, particularly teachers, require access to opportunities that enhance their abilities and professional values. The lack of research in TKPE in Malaysia may also be attributed to publication bias, where researchers may choose to focus on other areas of research that are deemed more important or receive more attention. However, it is crucial for Malaysia to prioritize research in TKPE to ensure that the government's aspirations for teacher professionalism and the development of human resources are met in the 21st century.

Therefore, the results of this bibliometric study have significant implications for the Malaysian education system and its stakeholders, as it highlights the need for more research in TKPE and the importance of allocating resources and attention towards this area of study.

Conclusion

This study intends to investigate the trend and pattern of TKPE research by looking at the status of publication, the citation pattern, presenting the themes involved, and offering suggestions for future TKPE research. This investigation will be carried out by looking at the status of publication, the citation pattern, presenting the themes involved, and offering suggestions. The findings indicate that the TKPE has been evenly dispersed and is having a significant impact, which is evidenced by the growth in the number of publications outside of Europe, such as in North America, Oceania, and Asia. This can be seen as evidence of the significance of the impact that the TKPE is having. In this study, the information that was obtained from the Scopus database is presented using a bibliometric methodology. This methodology includes the presentation of quantity, quality, and a structural map (i.e., the number of publications by year, document types, languages, keyword analysis, most active source titles, countries with the most contributions in the TKPE research, most active institutions, the number of citations and citation metrics) (Kokol et al. 2021). However, there are several limitations to the study, such as the fact that the discussion is derived from a bibliometric analysis of published TKPE research between the years 1989 to 25 July 2022 which may have excluded some relevant publications that were published after this date. Additionally, the study only includes publications that were indexed in the SCOPUS database and met the inclusion criteria, which may have resulted in the exclusion of relevant publications from other databases or that did not meet the criteria. It is important to highlight that the research was carried out just using the database Scopus and that its findings are predicated on the most popular keywords found in document titles. Pueo & Jimenez-Olmedo (2017) also agreed that primary source of data like Scopus helps researchers to gain knowledge about new research. This research did not take into account any of the other significant and vast databases that discussed the TKPE, such as the Web of Science, Google Scholar, or EBSCO Hosts. As a result, it can restrict the final conclusion of the TKPE publishing trends in the area of research. It is possible for future research to make use of a variety of databases in order to carry out searches, modify and compare the results of various keyword phrases, and investigate how TKPE research differs according to subject areas of study. At this moment, it seems likely that TKPE research will be able to produce some useful findings.

The present study offers a complete picture of recent research on the TKPE growing trends in articles, journal performance, cooperation patterns, and research constituents, all of which contribute to increased understanding. Every one of these indicators leads to an increase in this area of study, which may lead to new opportunities for making strides in the field of education. In addition, all of these contributions will assist younger researchers in developing a more well-rounded understanding of this topic (V. K. Singh et al., 2021). This study provides another addition by applying the bibliometric technique in order to enhance the comprehension of the literature on Physical Education held by academics. For this reason, bibliometric studies will continue to be an important tool for evaluating the gaps in any topic or area (Schöggl et al., 2020). Therefore, academics may use this method to carry out their study, particularly when it comes to carrying out literature

reviews on the subject matter that interests them. The results of this study will provide certain scholars with assistance in comprehending the TKPE's international success in the domains of Physical Education and education, as well as identify topics for further research. It is anticipated that the TKPE will continue to be applicable throughout the following decade as a result of its extensive application in Physical Education across the globe.

References

Ahmi, A., & Mohd Nasir, M. H. (2019). Examining the trend of the research on extensible business reporting language (xbrl): A bibliometric review. *International Journal of Innovation, Creativity and Change*, *5*(2).

Alfrey, L., Cale, L., & A. Webb, L. (2012). Physical education teachers' continuing professional development in health-related exercise. *Physical Education and Sport Pedagogy*, *17*(5), 477–491. https://doi.org/10.1080/17408989.2011.594429

Almonacid-Fierro, A. A., Merellano-Navarro, E., Molina, S. F., Carrizosa, M. V., & Fernández, R. O. (2019). Qualitative perspective in the construction of didactic content knowledge in Physical Education teachers. *Retos*, *36*(2), 459–468.

Arnau-Mollá, A. F., & Romero-Naranjo, F. J. (2022). A bibliometric study on body percussion based on high impact search engines. *Retos*, *45*, 679–692. https://doi.org/10.47197/retos.v45i0.92653

Baas, J., Schotten, M., Plume, A., Côté, G., & Karimi, R. (2020). Scopus as a curated, high-quality bibliometric data source for academic research in quantitative science studies. *Quantitative Science Studies*, *1*(1), 377–386. https://doi.org/10.1162/qss_a_00019

Barker, D., Nyberg, G., & Larsson, H. (2021). Introduction to the PESP special issue: 'Developing movement capability in physical education.' *Physical Education and Sport Pedagogy*, *26*(3), 225–229. https://doi.org/10.1080/17408989.2021.1886272

Barnett, L. M., Stodden, D., Cohen, K. E., Smith, J. J., Lubans, D. R., Lenoir, M., Iivonen, S., Miller, A. D., Laukkanen, A., Dudley, D., Lander, N. J., Brown, H., & Morgan, P. J. (2016). Fundamental movement skills: An important focus. *Journal of Teaching in Physical Education*, *35*(3), 219–225. https://doi.org/10.1123/jtpe.2014-0209

de Greeff, J. W., Bosker, R. J., Oosterlaan, J., Visscher, C., & Hartman, E. (2018). Effects of physical activity on executive functions, attention and academic performance in preadolescent children: a meta-analysis. *Journal of Science and Medicine in Sport*, *21*(5), 501–507. https://doi.org/10.1016/j.jsams.2017.09.595

Espinosa, S. G., Godoy, S. J. I., Molina, S. F., & Galatti, L. R. (2017). Intervention programs for sports education in the school context, PETB and PEAB: Preliminary study. *Retos*, *31*, 107–113. https://doi.org/10.47197/RETOS.V0I31.43545

Hastie, P. A., & Casey, A. (2014). Fidelity in models-based practice research in sport pedagogy: A guide for future investigations. *Journal of Teaching in Physical Education*, *33*(3), 422–431. https://doi.org/10.1123/jtpe.2013-0141

Hung, H. C., Shwu-Ching Young, S., & Lin, K. C. (2018). Exploring the effects of integrating the iPad to improve students' motivation and badminton skills: a WISER model for physical education. *Technology, Pedagogy and Education*, *27*(3), 265–278. https://doi.org/10.1080/1475939X.2017.1384756

Jack, M. M., Gattozzi, D. A., Camarata, P. J., & Shah, K. J. (2021). Live-Streaming Surgery for Medical Student Education - Educational Solutions in Neurosurgery During the COVID-19 Pandemic. *Journal of Surgical Education*, *78*(1), 99–103. https://doi.org/10.1016/j.jsurg.2020.07.005

Jemaah Nazir. (2019). *Buku Panduan Pengurusan Mata Pelajaran Pendidikan Jasmani dan Pendidikan Kesihatan*. Kementerian Pendidikan Malaysia.

Jung, H., Pope, S., & Kirk, D. (2016). Policy for physical education and school sport in England, 2003–2010: vested interests and dominant discourses. *Physical Education and Sport Pedagogy*, *21*(5), 501–516. https://doi.org/10.1080/17408989.2015.1050661

Kirk, D., & Macdonald, D. (1998). Situated learning in physical education. *Journal of Teaching in Physical Education*, *17*(3), 376–387. https://doi.org/10.1123/jtpe.17.3.376

Kokol, P., Blažun Vošner, H., & Završnik, J. (2021). Application of bibliometrics in medicine: a historical bibliometrics analysis. *Health Information and Libraries Journal*, *38*(2), 125–138. https://doi.org/10.1111/hir.12295

KPM. (2013). Malaysia Education Blueprint 2013 - 2025. In *Kementerian Pendidikan Malaysia* (Vol. 27). http://linkinghub.elsevier.com/retrieve/pii/S0742051X10001435

KPM. (2019). *Pelaporan Pentaksiran Sekolah Rendah*.

Kumbure, M. M., Lohrmann, C., Luukka, P., & Porras, J. (2022). Machine learning techniques and data for stock market forecasting: A literature review. *Expert Systems with Applications*, *197*(April 2021), 116659. https://doi.org/10.1016/j.eswa.2022.116659

Kwon, M., & Choi, Y. (2022). Exploring Categories of Self-Development of Novice Physical Education Teachers through Teacher Learning Community Activities. *Sustainability (Switzerland)*, *14*(7). https://doi.org/10.3390/su14073718

Lander, N. J., Barnett, L. M., Brown, H., & Telford, A. (2015). Physical education teacher training in fundamental movement skills makes a difference to instruction and assessment practices. *Journal of Teaching in Physical Education*, *34*(3), 548–556. https://doi.org/10.1123/jtpe.2014-0043

Light, R. (2008). Complex learning theory-its epistemology and its assumptions about learning: Implications for

physical education. *Journal of Teaching in Physical Education*, *27*(1), 21–37. https://doi.org/10.1123/jtpe.27.1.21

Ling, O. S., & Hian, T. C. (2021). *Persepsi guru pj terhadap pjk kualitatif*. *February*.

Martínez-Bello, V. E., Bernabé-Villodre, M. del M., Lahuerta-Contell, S., Vega-Perona, H., & Giménez-Calvo, M. (2021). Pedagogical Knowledge of Structured Movement Sessions in the Early Education Curriculum: Perceptions of Teachers and Student Teachers. *Early Childhood Education Journal*, *49*(3), 483–492. https://doi.org/10.1007/s10643-020-01090-0

Martins, R., Pereira, E., Rosado, A., & Mascarenhas, M. (2021). Exploring the relationship between sport demand's key players and environmental sustainability: Pointers from a systematic review. *Journal of Outdoor Recreation and Tourism*, *35*(August). https://doi.org/10.1016/j.jort.2021.100419

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *BMJ (Online)*, *339*(7716), 332–336. https://doi.org/10.1136/bmj.b2535

Moy, B., Renshaw, I., Davids, K., & Brymer, E. (2016). Overcoming acculturation: physical education recruits' experiences of an alternative pedagogical approach to games teaching. *Physical Education and Sport Pedagogy*, *21*(4), 386–406. https://doi.org/10.1080/17408989.2015.1017455

Pastor-Vicedo, J. C., Martínez-Martinez, J., López-Polo, M., & Prieto-Ayuso, A. (2020). Recreos activos como estrategia de promoción de la actividad física: una revisión sistemática. *Retos*, *2041*(40), 135–144. https://doi.org/10.47197/retos.v1i40.82102

Pueo, B., & Jimenez-Olmedo, J. M. (2017). Application of motion capture technology for sport performance analysis. *Retos*, *2041*(32), 241–247.

Ramos-Perez, D., Fernandez, F. T. G., Burguenõ, R., & Morente-Oria, H. (2021). Curricular proposal through the traditional game of Mate: Tool for improving perceptual-decisional skills in Secondary school physical education students. *Retos*, *42*, 517–523. https://doi.org/10.47197/RETOS.V42I0.87357

Rijal, R. R. (2016). Teachers' Engagement in Bringing out the Best in Students. *Tribhuvan University Journal*, *30*(2), 155–164. https://doi.org/10.3126/tuj.v30i2.25561

Samruhaizad, S., & Azahan, A. (2017). Pendidikan Sebagai Komponen Kualiti Hidup Masyarakat Pinggir Bandar. *Asian Journal of Environment, History and Heritage*, *1*(1), 267–280.

Schöggl, J. P., Stumpf, L., & Baumgartner, R. J. (2020). The narrative of sustainability and circular economy - A longitudinal review of two decades of research. *Resources, Conservation and Recycling*, *163*(April), 105073. https://doi.org/10.1016/j.resconrec.2020.105073

Sierra-Díaz, M. J., González-Víllora, S., Pastor-Vicedo, J. C., & López-Sánchez, G. F. (2019). Can We Motivate Students to Practice Physical Activities and Sports Through Models-Based Practice? A Systematic Review and Meta-Analysis of Psychosocial Factors Related to Physical Education. *Frontiers in Psychology*, *10*(October). https://doi.org/10.3389/fpsyg.2019.02115

Singh, P. K. (2022). t-index: entropy based random document and citation analysis using average h-index. *Scientometrics (2022)*, *127*, 637–660. https://doi.org/10.1007/s11192-021-04222-4 t-index:

Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus and Dimensions: A comparative analysis. In *Scientometrics* (Vol. 126, Issue 6). Springer International Publishing. https://doi.org/10.1007/s11192-021-03948-5

UNESCO. (2017). *Education for Sustainable Development Goals (SDGs)* (C. Nolan (ed.)). United Nations Educational.

Valverde-Berrocoso, J., del Carmen Garrido-Arroyo, M., Burgos-Videla, C., & Morales-Cevallos, M. B. (2020). Trends in educational research about e-Learning: A systematic literature review (2009-2018). *Sustainability (Switzerland)*, *12*(12). https://doi.org/10.3390/su12125153

Wainwright, N., Goodway, J., Whitehead, M., Williams, A., & Kirk, D. (2018). Laying the foundations for physical literacy in Wales: the contribution of the Foundation Phase to the development of physical literacy. *Physical Education and Sport Pedagogy*, *23*(4), 431–444. https://doi.org/10.1080/17408989.2018.1455819

Wang, N., Rahman, M. N. B. A., & Daud, M. A. K. B. M. (2021). Diversified Talent Cultivation Mechanism of Early Childhood Physical Education Under the Full-Practice Concept – Oriented by Preschooler Mental Health and Intelligent Teaching. *Frontiers in Psychology*, *11*. https://doi.org/10.3389/fpsyg.2020.593063

Wee, E. H., Cheng, W. F., & Chin, N. S. (2021). Teachers ' Perceived Barriers to Implementation of Physical Education : Examining the Administration of Physical Education Programme and the Provision of Non-human Resources. *Coll. Antropol.*, *45*, 191–200. https://doi.org/10.5671/ca.45.3.2

Wright, S. C., & Grenier, M. (2019). An Exploratory Study of Physical Education Teacher Education Graduates' Job Histories. *Research Quarterly for Exercise and Sport*, *90*(4), 555–566. https://doi.org/10.1080/02701367.2019.1633458

Yakub, Y., Hassan, S., Ishak, A., Azmi, S. H., Muszali, R., Ahmad, Y., & Karim, Z. A. (2019). The influence of infrastructure, accountability and teacher competency towards teaching process implementation in physical education and health. *International Journal of Innovative Technology and Exploring Engineering*, *9*(1), 4637–4639. https://doi.org/10.35940/ijitee.A4725.119119

Zulkifli, A. F., & Danis, A. (2021). Individual knowledge of, perceptions about, and barriers to physical literacy (PL) in Malaysia. *Physical Culture and Sport, Studies and Research*, *90*(1), 26–38. https://doi.org/10.2478/pcssr-2021-0011