ISSN (PRINT) : 2549-9955 ISSN (ONLINE): 2549-9963
JURNAL ILMIAH PENDIDIKAN FISIKA
https://ppjp.ulm.ac.id/journals/index.php/jipf/index

Bibliometric Analysis of Household Physics in Scopus Database: Approaches with Bibliometrix R-package and VOSviewer (Review of Literature on Home Physics Education)

Fatra Faiza Majid[1] and Buyamin[2*]
[1]Faculty of Science and Mathematics, Universitas Diponegoro , Semarang, Indonesia
[2]Centre for Public Policy Research, National Research and Innovation Agency, Indonesia
*buya001@brin.go.id

Abstract

This study conducts bibliometric research using the Bibliometrix R-package analysis and VOSviewer to analyse Scopus databases from 1921 to 2024, specifically focusing on physics and households. It aims to determine the number of writings on home physics education in scientific publications, analyse publication trends, identify prolific authors, identify frequently used keywords and subject areas, and identify the countries that make the most contributions to publication. The research study found one article and was the only one published in 1921, entitled "The Evolution of Nerve Muscle Mechanisms" written by Russell S.B. Davies M and Kutner R were the two most productive authors, "radon" became the most widely used author keyword in publications. Physics and astronomy became the topics of the most frequently appearing publications. The U.S. emerged as the largest publisher and the most collaborative among the countries involved in the publication. Moreover, Indonesia has become the fifth-largest publisher in the world. Out of all the study papers, only five addressed home physics education. To encourage researchers, lecturers, and students to publish findings and research results linked to household physics in international scientific journals, it is believed that the findings of this study will be useful to higher education and research institutes.

Keywords: bibliometrics; physics; physical household; Scopus Database; VOSviewer

Received : 15 March 2024
Accepted : 5 June 2024
Published: 26 June 2024
DOI : https://doi.org/10.20527/jipf.v8i2.12106

How to cite: Majid, F. F. & Buyamin, B. (2024). Bibliometric analysis of household physics in scopus database: Approaches with bibliometrix r-package and vosviewer *Jurnal Ilmiah Pendidikan Fisika*, 8(2), 194-206.

INTRODUCTION

Physics plays an important role in developing tools needed in human life, such as household appliances (Renostini Harefa, 2019). This role of physics enabled him to create designs, features, and mechanisms that improve the performance and efficiency of the equipment used in every household. Various household appliances such as door lockers to ensure security (Pratama & Prasetyo, 2021), kitchen cooling temperature regulators (Hedeen et al., 2022), signal transmission utilisation to support the operation of smart household devices (Xia et al., 2019), and sensing equipment for operating domestic devices (Diyan et al., 2020).

The book "Household Physics," which promotes the use of technology in households through appropriately limited relationships between household science students and new technologies, first introduced household physics in the United States in 1931 (S., 1932). The most influential and popular textbook on household physics is "Household Physics: A Textbook for College Students in Home Economics," written by Madalyn Avery and published in 1938 (Behrman, 2017). This fact suggests that household physics has evolved for more than 100 years; of course, there have been many scientific publications related to home physics.

The researchers conducted the research to uncover the trends in scientific publications about physics and households, identify the most prolific authors, identify the most frequently used subject areas for publication, and identify the countries most actively engaged in this research theme. In addition, it is to ascertain the quantity of scientific literature published in international journals about home physics education.

It is hoped that scientists, educators, and physics majors will conduct more studies on mathematical physics in the future to further scientific work that promotes advancements in the application of physics in the home.

METHOD

Database Selection Criteria

There are many international indexing machines or collectors of journals from a wide range of publishers, including Scopus, Web of Science, and Dimensions (Singh et al., 2021). Scopus has many advantages over other journal indexing (Yan & Zhiping, 2023). This study chose Scopus as the search engine, considering that the Scopus database has high-quality standards (Baas et al., 2020).

Data collection

The literature collection in this study relates to physics and households. Therefore, data searches in Scopus are performed using the keywords "physics," "household," and "Physics household" in the title, abstract, and keyword articles in the Scopus database (Trivisonno et al., 2022). Searching research data through Scopus on March 8, 2024, using TITLE-ABS-KEY (physics* AND household* OR "Physics household") produced 366 documents. This data search found all publications from 1921 to 2024.

Database files have been downloaded from Scopus in BibTeX and RIS formats for further analysis using Bibliometrix R-package and VOSviewer. BibTeX is a bibliographic flat file format and a software program for processing these files to generate reference lists (BibTeX, 2010). RIS (Research Information System) is a tagged file format used for bibliographic information in various scientific databases, journals, library catalogs, and certain quotation management programs (Marina, 2022).

Research analysis employs bibliometric analysis, utilising the Bibliometrix R-package and VOSviewer applications (Aria & Cuccurullo, 2017). VOSviewer is a software that creates maps based on network data by exploring shared writing and events, combining bibliography, quotations, and shared quotation links (Arruda et al., 2022).

RESULT AND DISCUSSION

Year of publication

The publication relating to physics and households has a history that began in 1921 with an article entitled "The Evolution of Nerve Muscle Mechanisms" written by Russell S.B. and published by the Journal of Comparative Psychology. This article reviews the origins and development of neuromuscular

mechanisms in living organisms by combining chemistry, physics, and mechanics concepts, especially in the household field. Some concepts discussed in this article include unifying carbon and oxygen, energy, energy releases, explosions such as gas engines, and hole burners from household gas stoves (Russell, 1921).

During the publications from 1921 to 2023 (for 104 years), there were a total of 366 publications. However, there were few publications between 1921 and 1970, even though there were only three publications during that period: 1921, 1940, and 1955. In the period 1921 to 1989 (for 69 years), only 15 were published. Between 1921 and 1989, there were very few publications because most focused on other scientific fields, making domestic physics a less popular area of study. Meanwhile, many scientific studies have focused on household physics in 2021 (Bergwik, 2014). Publications on this topic began to increase significantly starting in the 1990s. Out of 104 years, 58 have had no publication articles, leaving a publication period of 55.77%. Effective publication occurs in only 46 years or 44.23%. The highest publication was recorded in 2020 with 31 documents, followed by 2021 with 29 documents, 2023 with 23 documents, and 2012 with 21 documents. Overall, publication trends related to physics and households significantly improve over time. It marks the growing interest of authors and publishers in researching this topic. Figure 1 illustrates the progress of the publication period related to physics and households.

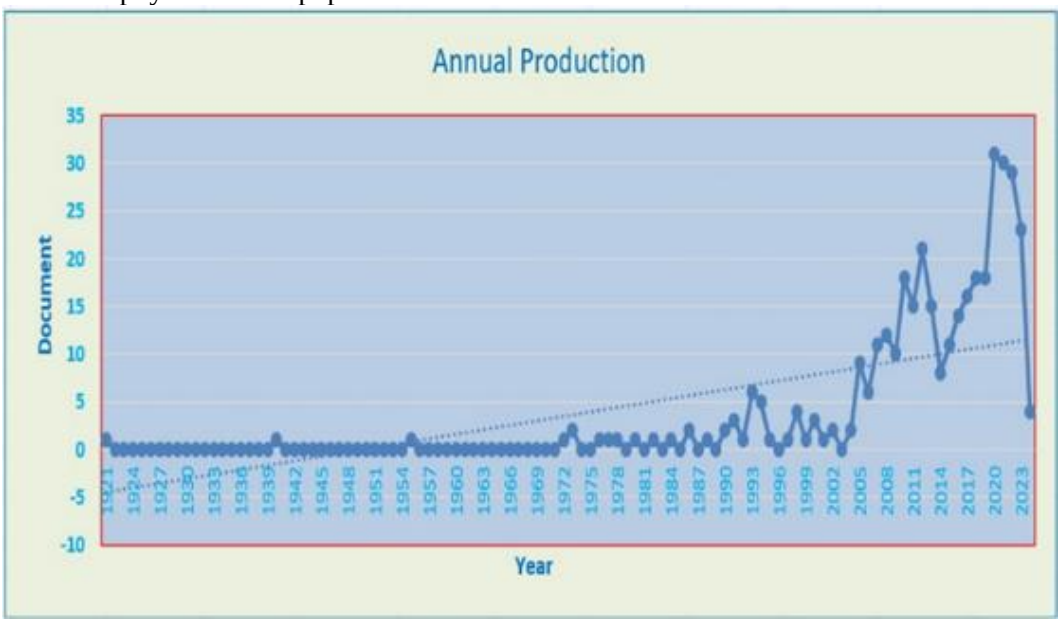

Figure 1 Publications related to physics and households

Document type of publication

At the beginning of the research period, authors and publishers did not pay much attention to publications related to physics and households. It's only since 2005 that the number of publications has experienced a significant surge, exceeding five papers. The peak is in 2020 when 31 publications cover various topics.

Of the 366 publications, the majority are articles and conference papers. Other publications such as book chapters, reviews, conference reviews, books, notes, editorials, letters, and short surveys are still few to count. Articles are the most dominant type of publication,

reaching 202 documents (55.19%), followed by conference papers with 115 documents (31.42%), and reviews with 17 documents (4.64%). Despite the dominance of the article, we can also identify contributions from other publications, indicating the diversity of research in physics and households.

Subject area of publication

Publications related to physics and households can be grouped into 23 different area subjects. The topics most interesting are Physics and Astronomy, with 135 publications. Other areas that also have significant publications are Engineering (108 documents), Environmental Science (71 documents), Computer Science (56 documents), and Medicine. (50 documents). Figure 2 gives a visual overview of the distribution of scientific publications on physics and households by subject area.

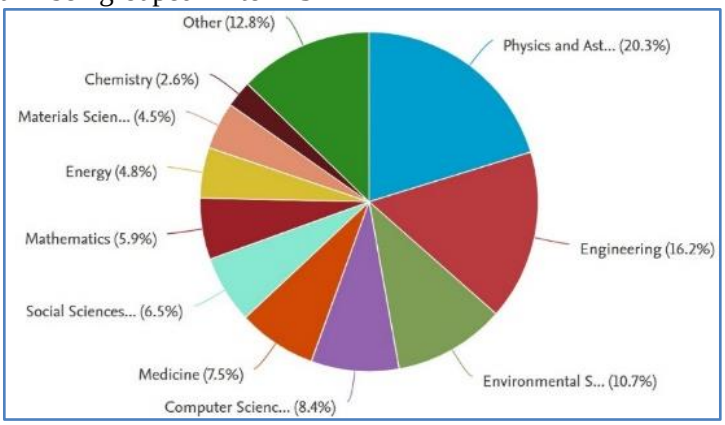

Figure 2 Publications by subject area

Out of a total of 366 publication papers included in this article, they cover 23 different areas of subjects. In addition to the areas mentioned earlier, there are subjects such as Social Sciences, Mathematics, Energy, Materials science, Chemistry, Chemical Engineering, and Agricultural and Biological Sciences. Earth and Planetary Sciences; Biochemistry, Genetics, Molecular Biology, and Art and Humanities.

The topics with the highest number of publications are Physics and Astronomy, which accounted for 135 documents (20.3% of the total), followed by Engineering with 108 documents (16.2%). Physics, astronomy, and engineering are the two topics of the area, with publications of more than 100 documents, whereas the other subjects have 71 document publications or less. Of the 23 topics in the area, seven (about 30.43%) have five or fewer publications, while the other 16 (69.57% or more) have six or more publications. It shows variations in interest levels and research in various subjects related to physics and households.

Authors involved

This publication involves 1,178 authors, which indicates extensive collaboration in research related to physics and households. The three most productive authors in producing publication documents are Chen J, Davies M, and Kutner R, each with five papers. Chen J. held a position at the University of Utah in the United States. His areas of interest for study included engineering, energy, computer science, chemical engineering, Earth and planetary sciences, and mathematics. Davies M is employed at the Bartlett Faculty of the Social Sciences, where he conducts research in materials science, computer science, mathematics, physics, and astronomy. Kurtner R, in the meantime, conducts research in Statistical Physics of Complex Systems, Econophysics, Co-creation, Financial

Modelling, and Agent-Based Simulation at the Faculty of Physics, University of Warsaw. Furthermore, four other authors have also made significant contributions with four publication papers: Beetz M, Jagielski M, Symonds P, and Taylor J. Figure 3 further overviews 11 authors who have published three or more documents. It reflects the diversity and contributions of various authors to this research and shows that some authors have significantly impacted physics and households.

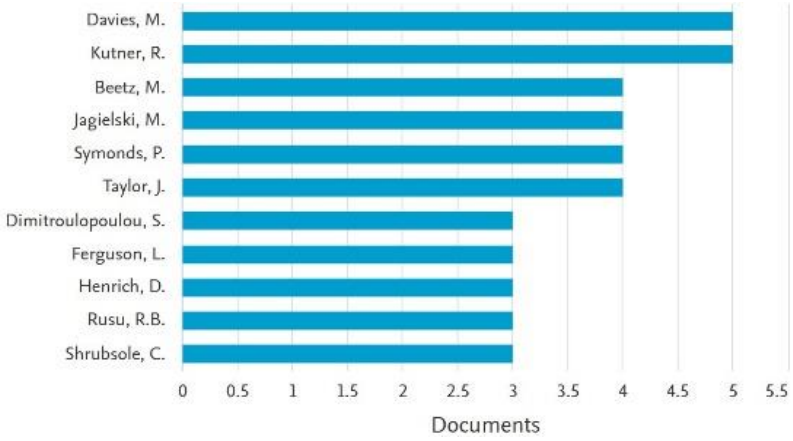

Figure 3 Comparison of the number of author documents

The analysis using VOSviewer against 1,178 authors resulted in visualisations showing 65 authors in the visualisation tables. Next, these authors are grouped into eight different clusters. The first cluster consisted of 12 authors, followed by the second and third clusters, each consisting of 10 authors. Then, there was the fourth cluster with nine authors; the fifth cluster composed eight authors; and the sixth cluster had seven writers. The seventh cluster had five authors, and the eighth cluster had four writers.

This visualisation provides an overview of how relationships between authors are formed in a complex network of collaborations. These clusters indicate a certain concentration of collaboration or expertise between groups of authors. Additionally, Figure 4 displays a visualisation overlay that describes the authors' interactions and distribution within this analysis. Figure 4 illustrates the concentration of work or areas of expertise of various writers by using different cluster colours. This visualisation can help further understand each author's collaboration patterns and contributions to research related to physics and households.

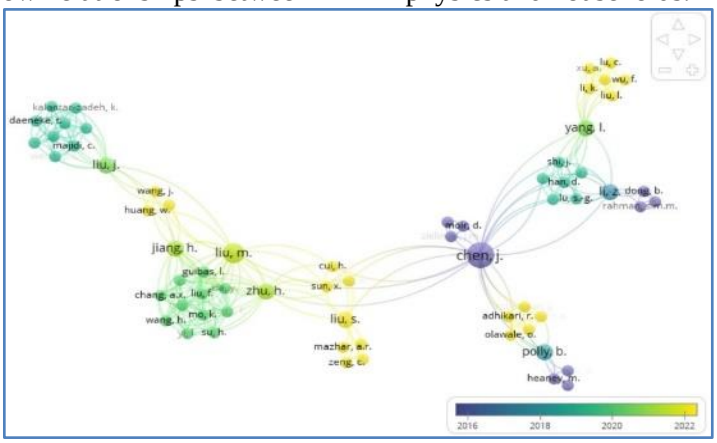

Figure 4 Author overlay visualisation using VOSviewer

This study had 366 publications involving 1,178 authors, using 967 authors' keywords, references to 218 document sources, and 11,302 references. Of the total number of authors involved, three authors (0,25%) managed to produce five documents, five authors (0,42%) produced four documents, nine authors (0,76%) produced three documents, 48 authors (4,07%) produced two documents, and as many as 1,113 authors (94,48%), produced one document.

Three authors who succeeded in producing five papers were Chen J, Davies M, and Kutner R. Meanwhile, authors like Beetz M, Jagielski M, Symonds P, and Taylor J produced four papers each. Other authors who succeeded in producing three papers include Dimitroulopoulou S, Ferguson L, Henrich D, Kim J, Liu K, Lu M, Ren Z, Rusu RB, and Shrubsole C. A visual analysis of the sheet shows that grouping authors into clusters considers scientific interconnections, including article sources, authors, publishers, quotations, and joint writing relationships between authors (Vittori et al., 2022). For example, among the authors in Cluster 1, such as Chang AX, Guibas L, Liu F, Mau K, Qin Y, Su H, Wang H, Xia Y, Xiang F, Yi L, Yuan Y, and Zhu H, although they happen to publish articles in the same year (2020), there is a significant link between them in the network of collaborations.

Keywords and publication theme changes

An analysis using Bibliometrix R-Studio of 366 publication documents found 3.059 keywords plus 967 author's keywords. Furthermore, of the 967 author's keywords, as many as 200 were selected to be displayed in Words Cloud Author's Keywords through the Bibliometrix R-package. Out of the 200 author's keywords selected, only one author's keyword appeared more than ten times, i.e., "radon" appeared 13 times. Most of the other 200 Authors' Keywords appeared less than three times, totalling 177 or 88.50%. Figure 5 shows a word cloud visualisation of the selected 200 Author's KeyWords. This visualisation gives a clear picture of the frequency of appearance of each author's keyword in the publication document being analysed. In other words, the larger the keyword in the word cloud, the more often it appears in the publication document. Thus, this analysis provides valuable insights into trends and research foci related to physics and households based on keywords used by the authors.

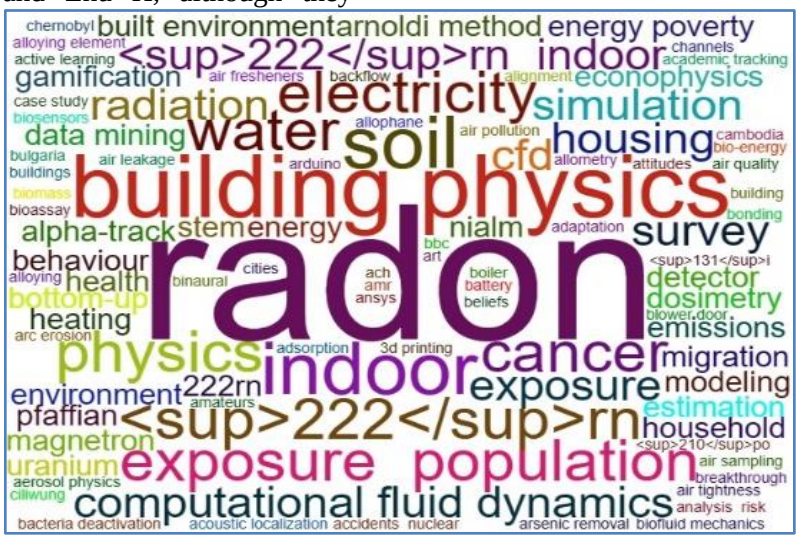

Figure 5 Word cloud of author keywords using bibliometrix R-package

Bibliometric analysis of the change in publication themes has been carried out by dividing the data into three periods: 2010-2016, 2017-2020, and 2021-2024. Table 1 presents some of the themes used in the publication of articles in the three periods.

Table 1 Period of change of research themes

From		To		Keywords used
Period	**Theme**	**Period**	**Teme**	
1921 - 2009	air quality; article; concentration (parameters); domestic appliance; dosimetry; heating; radon	2010 - 2016	Heating; article; physics	air quality; heating; article; human; humans; environmental exposure; adult; female; radiation dosage; male; middle-aged; radiation dose; methodology; child; housing; indoor air pollution; air conditioning; building; regression analysis; domestics appliances; risk assessment; household; priority journal; electricity; computer simulations
2010 - 2016	article; condensed matter physics; European union; heating; physics; behavioral research	2017 - 2020	heating; high energy physics; human; physics; autonomous agents; air quality; high energy physics	article; human; humans; behavioral research; education; condensed matter physics; household income; air quality; indoor air pollutions; indoor air; commerce; energy efficiency; heating; housing; energy utilization; energy conservation; air conditioning; buildings; energy performance; physics-based modeling; domestic appliances; electric power transmission networks; molecular physics; potential energy; priority journal, physics
2017 - 2020	heating; high energy physics; physics; students	2021 - 2024	energy management; energy utilization; household; covid	buildings; energy management; energy efficiency; heating;energy utilization; housing; space heating; air conditioning; energy performance; domestic appliance; human; article; physics; household; students

Bibliometric analysis showed that the topics changed from the period 1921-2009 to the period 2010-2016, with the most popular publication changes being "article," "human," "humans," "environmental exposure," "adult," "female," "radiation dosage," "male," "middle-aged," "radio dose," "methodology," and "child." The main publication themes were "article," "human," "human," "energy efficiency," "heating," "housing," "energy utilisation," "energy conservation," 'air conditioning," "buildings," "Energy performance," "physics-based modeling." While the publication's topics were changed from 2017-2020 to 2021-2024, the most frequently popular keywords were "Physics," "household," "energies efficiency," "heat," "Energies utilisation," "Housing," "space heating," "energies and performance."

Countries involved in the publication

Analysis using the Bibliometrix R-package of 366 publications in this study revealed that there were 55 countries involved in publications, with a total of 1,181 participants. Most countries involved were from the American continent, Europe, Asia, and Australia. Of these 55 countries, two countries have been involved with publications more than 100 times: the United States, which has 303 publications, and China, which

has 107 publications. In addition, 22 other countries participated in the number of publications between 10 and 81, and 30 countries were involved in fewer than 10 publications. There are also six countries involved in only one scientific publication: Argentina, Belarus, Cyprus, Egypt, Lebanon, and Saudi Arabia.

The countries with the highest participation in the publication are the United States, China, Germany, the United Kingdom, Indonesia, Japan, Italy, India, South Korea, and Canada. These nations, which come from different continents, participate in publications on this subject. Figure 6 shows countries' involvement in physics and household publications. This analysis provides a clear overview of the contributions of different countries to this research and highlights the diversity and distribution of involvement worldwide.

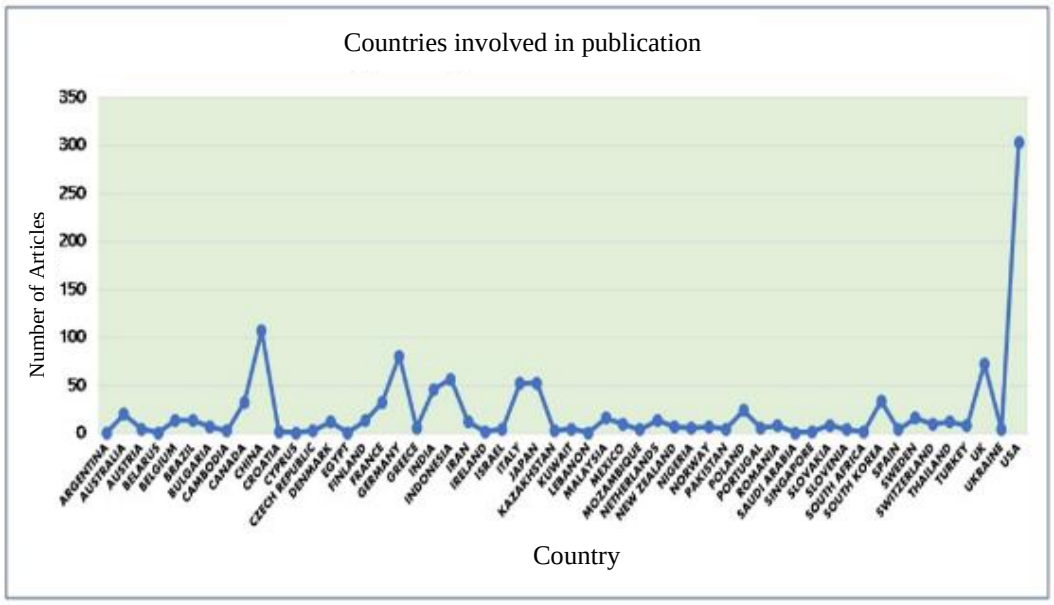

Figure 6 Countries involved in the publication

In analysing the country's role, Indonesia ranks fifth in scientific publications using themes related to physics and households, with 57 participants. Indonesia has surpassed other Asian countries such as Japan, India, South Korea, Malaysia, Iran, and Thailand. This contribution marks Indonesia's seriousness in contributing knowledge and innovation in household physics.

Some of the authors affiliated in Indonesia include Ubaidillah Zuhdi of the Bandung Institute of Technology (2 articles), Muhammad Sholeh of the University of Eleven March, Surakarta (1 article), Budi Astuti of the Semarang State University (1 article) and Herdis Herdiansyah of the Indonesian University, Jakarta. (1 article). They have made valuable contributions to scientific literature, representing Indonesia's diverse educational and research institutions.

A writer with affiliations in Indonesia has started publishing since 2014, beginning with Ubaidillah Zuhdi's article entitled "The impacts of final demand changes on the total output of Indonesian ICT sectors: An analysis using an input-output approach," which has received ten citations so far (Zuhdi, 2014).

One of the most quoted articles by an author with affiliations in Indonesia is an article by MI Setiawan, who has received 17 quotes. The article "E-Business,

Airport Development and Its Impact on the Increasing Information and Communication Development in Indonesia" discusses the impact of information and communication technology developments on the performance of airports in Indonesia. The contributions of these Indonesian authors reflect the diversity of research carried out in this country in the context of physics and household, as well as its relevance in the global knowledge field (Setiawan et al., 2018).

International Journals' Literature on Home Physics Education

Just five research documents, or 1.37% of the 366 research documents, address schooling. The five research papers that address education are displayed in Table 2. Out of the five publications, only Forndran F and Zacharias CR's work from 2019 garnered citations—13 total—while the other four articles were unsuccessful in doing so.

Table 2 International Journals of Household Physics Education Literature

Author	Title	Year	Source Title	Citation
Forndran F., Zacharias C.R.	Gamified experimental physics classes: A promising active learning methodology for higher education	2019	Eur. J. Phys.	13
Desnita	Multipurpose tube from waste to instructional media for physics education	2019	J. Phys. Conf. Ser.	0
Hruška M., Pfeffirova M.S.	How to Conduct Sound Experiments in Distance Education?	2022	AIP Conf. Proc.	0
Ignatov I., Iliev M.T., Gramatikov P.S.	Education Program on Physics and Chemistry for Non-Equilibrium Processes at the Interfaces between Solid-Liquid-Gaseous Media	2023	Eur. J. Contemp. Educ.	0
Kao S., Chea P., Song S.	Upper secondary school tracking and major choices in higher education: to switch or not to switch	2024	Educ. Res. Policy Pract.	0

Forndran F and Zacharias CR's (2019) articles discuss the use of game design elements in non-game contexts in higher education (Nordin et al., 2019). Desnita's (2019) article discusses the waste recycling process to produce physics learning media, which was introduced under the name “Multipurpose Tube” (Desnita, 2019). The article by Hruška M and Pfeffirova MS (2022) discusses how to realise experiments in an online environment, with one of the challenges being to transfer experiments to a distance teaching form (Hruška & Pfeffirova, 2022). The article by Ignatov I, Liev MT, and Graatikov PS (2023) discusses the implementation of education using non-equilibrium processes in physics and chemistry through a laboratory experiment program on non-equilibrium processes (Ignatov et al., 2023). The article by Kao S, Chea P, and Song S discusses the characteristics of Cambodian students in Cambodia in 2020 who are transitioning from upper secondary to higher education (Kao et al., 2024).

Scientific publications on household physics still belong very little to the academic sphere. In 104 years, only 366 publications were recorded in various international journals, meaning an average of only 3.52 published annually, or 0.29 per month. This average is far less than the number of international scientific journals, which reached over 150,000, and the national journal indexed

by Sinta, which numbered more than 64 (Scimagojr, 2024) (Ruangjurnal, 2024). This analysis found that the article became the most dominant form of publication on household physics. It shows the researchers' interest in spreading knowledge through journal articles. Nevertheless, other types of publication are not completely ignored either. The selection of journal articles as a form of publication may be considered because journal articles are more often quoted by other researchers, increasing the impact of research (González-Albo & Bordons, 2011).

The most influential article by Davies M is entitled "Systemic inequalities in indoor water pollution exposure in London, UK" published in 2021 and has received 28 citations (Ferguson et al., 2021). Meanwhile, the most influential article by Kutner R is "Modelling of income distribution in the European Union with the Fokker-Planck equation" published in 2013 and receiving 35 citations (Jagielski & Kutner, 2013). Both articles cover relevant topics and significantly contribute to household physics.

Despite the many authors' keywords that vary in publications, it turns out that only one keyword, "radon," appears more than ten times with 13 appearances. Most authors only appear once, indicating that there are still few publications that use them. Some of the other keywords that often pop up are "energy efficiency," "building physics," "indoor," and "soil," appearing five to seven times. It shows the focus and interest of researchers in some key topics in household physics but also highlights the potential for further research in other less exposed topics. Regarding authors' keywords, some experts define authors 'keywords as all terms selected and created by authors as core elements that summarise the entire substance of scientific publications (Lu et al., 2020).

The analysis using three periods in the change of research themes reveals several consistent themes that emerge in each period, including articles, heating, and physics. Keywords that often appear in every period of publication include "article," "human," "housing," "air conditioning," "domestic appliances," "building," and "household." The emergence of these themes and keywords reflects the interest of researchers in topics relevant to the topics that were popular at the time. For example, rising global incomes and temperatures drive demand for household room cooling devices such as air conditioning (Davis, 2016). Analysing this changing theme can provide valuable insights into the evolution of research themes in physics and households over time. By understanding the changing theme trends, researchers and policymakers can be better prepared and relevant in designing and implementing future research and development initiatives.

From the analysis, it can be seen that the United States dominates state involvement in publications on physics and households. The United States is also the country with the most collaborations with other countries in the publication of articles, especially with 20 countries reaching 28 collaborations. It's probably because these two countries are the world's largest users of air conditioning (World population review, 2024).

Overall, the study found that publications on household physics had increased, although the number still belonged to a small number. The most productive authors were Chen J of the University of Utah (United States), Davies M of Tampere University (Finland), and Kutner R of the University of Warsaw (Polandia). The topics most selected by the author are Physics and Astronomy. The United States is the country most involved in publications on this topic. The topic of domestic physics education does not emerge frequently in

international papers in bibliometric research on household physics.

With 366 papers published, an average of 3.52 articles are published annually, 0.31 articles per author, and 1.68 articles per source title. It is still highly conceivable that this publication average may rise even higher.

CONCLUSION

This analysis provides a comprehensive overview of research dynamics in household physics and the importance of international cooperation in advancing knowledge in domestic physics. Davies M and Kutner R became the two most productive authors on this topic, with "radon" being the most widely used author keyword in publications. The topics most selected by the author in this publication are Physics and Astronomy, while the United States is the country most involved in such publications. International publications still contain a very small amount of scientific literature regarding physics education in the home. The low average number of articles published on the topic of household physics indicates that there is a need for more research in this area. It is hoped that by using the findings of this study, research and higher education establishments will further inspire their professors, students, and researchers to conduct original research or expand on previously conducted work and publish their findings in international scientific journals. This will stimulate more general scientific advancements and help raise the profile and influence of domestic physics research.

REFERENCES

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, *11*(4), 959–975. https://doi.org/10.1016/J.JOI.2017.08.007

Arruda, H., Silva, E. R., Lessa, M., Proença, D., & Bartholo, R. (2022). VOSviewer and Bibliometrix. *Journal of the Medical Library Association*, *110*(3), 392. https://doi.org/10.5195/JMLA.2022.1434

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

Behrman, J. (2017). Domesticating physics: introductory physics textbooks for women in home economics in the United States, 1914–1955. *History of Education*, *46*(2), 193–209. https://doi.org/10.1080/0046760X.2016.1273404

Bergwik, S. (2014). An Assemblage of Science and Home: The Gendered Lifestyle of Svante Arrhenius and Early Twentieth-Century Physical Chemistry. *Isis, A Journal of the History of Science Society*, *105*(2), 265–291. https://doi.org/10.1086/676567

BibTeX. (2010). *BibTeX format explained*. Wikipedia. https://www.bibtex.com/g/bibtex-format/

Davis, L. (2016). *The global impact of air conditioning: big and getting bigger*. The Conversation. https://theconversation.com/the-global-impact-of-air-conditioning-big-and-getting-bigger-62882

Desnita. (2019). Multipurpose tube from waste to instructional media for physics education. *Journal of Physics: Conference Series*, *1185*(1), 012104. https://doi.org/10.1088/1742-6596/1185/1/012104

Diyan, M., Silva, B. N., & Han, K. (2020). A Multi-Objective Approach for

Optimal Energy Management in Smart Home Using the Reinforcement Learning. *Sensors*, *20*(12), 3450. https://doi.org/10.3390/S20123450

Ferguson, L., Taylor, J., Zhou, K., Shrubsole, C., Symonds, P., Davies, M., & Dimitroulopoulou, S. (2021). Systemic inequalities in indoor air pollution exposure in London , UK. *Europe PMC Funders Group*, *2*(1), 425–448. https://doi.org/10.5334/bc.100.Systemic

González-Albo, B., & Bordons, M. (2011). Articles vs. proceedings papers: Do they differ in research relevance and impact? A case study in the Library and Information Science field. *Journal of Informetrics*, *5*(3), 369–381. https://doi.org/10.1016/J.JOI.2011.01.011

Hedeen, N. D., Schaffner, D., & Brown, L. G. (2022). Tools and Techniques to Promote Proper Food Cooling in Restaurants. *Journal of Environmental Health*, *84*(7), 8. /pmc/articles/PMC9380651/

Hruška, M., & Pfeffirova, M. S. (2022). How to Conduct Sound Experiments in Distance Education? *AIP Conference Proceedings*, *2458*(1). https://doi.org/10.1063/5.0078245/2824871

Ignatov, I., Iliev, M. T., & Gramatikov, P. S. (2023). Education Program on Physics and Chemistry for Non-Equilibrium Processes at the Interfaces between Solid-Liquid-Gaseous Media. *European Journal of Contemporary Education*, *12*(3), 862–873. https://doi.org/10.13187/EJCED.2023.3.862

Jagielski, M., & Kutner, R. (2013). Modelling of income distribution in the European Union with the Fokker–Planck equation. *Physica A: Statistical Mechanics and Its Applications*, *392*(9), 2130–2138. https://doi.org/10.1016/J.PHYSA.2013.01.028

Kao, S., Chea, P., & Song, S. (2024). Upper secondary school tracking and major choices in higher education: to switch or not to switch. *Educational Research for Policy and Practice*, *23*(1), 89–113. https://doi.org/10.1007/S10671-023-09356-1/TABLES/8

Lu, W., Liu, Z., Huang, Y., Bu, Y., Li, X., & Cheng, Q. (2020). How do authors select keywords? A preliminary study of author keyword selection behavior. *Journal of Informetrics*, *14*(4), 101066. https://doi.org/10.1016/J.JOI.2020.101066

Marina. (2022). *The RIS (File Format) Explained*. MSK Library Blog. https://library.mskcc.org/blog/2022/09/the-ris-file-format-explained/

Nordin, M., Rahman, A., Khairi, W. M., Awang, W., Hafizi, S., & Hanafiah, M. (2019). Gamified experimental physics classes: a promising active learning methodology for higher education. *European Journal of Physics*, *40*(4), 045702. https://doi.org/10.1088/1361-6404/AB215E

Pratama, M. A., & Prasetyo, R. (2021). Modeling of Household Electronic Device Control Systems. *Jurnal Robotik*, *1*(1), 9–15. http://jurnal.teknokrat.ac.id/index.php/JurnalRobotik/article/view/40

Renostini Harefa, A. (2019). Peran Ilmu Fisika dalam Kehidupan Sehari-hari. *Warta Dharmawangsa*, *13*(2), 1829–7463. https://doi.org/10.46576/WDW.V0I60.411

Ruangjurnal. (2024). *Daftar Jurnal Sinta Bidang Fisika - Ruang Jurnal*. Ruang Jurnal Nasional. https://ruangjurnal.com/daftar-jurnal-sinta-bidang-fisika/

Russell, S. B. (1921). The Evolution of

Nerve Muscle Mechanisms. *Journal of Comparative Psychology*, *1*(5), 395–412. https://doi.org/10.1037/H0073100

S., J. H. (1932). (1) Everyday domestic science and hygiene (2) Household physics. *Nature 1932 130:3274*, *130*(3274), 150–150. https://doi.org/10.1038/130150a0

Scimagojr. (2024). *Journal Rankings on Physics and Astronomy (miscellaneous)*. Scimago Journal & Country Rank. https://www.scimagojr.com/journalrank.php?category=3101

Setiawan, M. I., Hasyim, C., Kurniasih, N., Abdullah, D., Napitupulu, D., Rahim, R., Sukoco, A., Dhaniarti, I., Suyono, J., Sudapet, I. N., Nasihien, R. D., Wulandari, D. A. R., Reswanda, Mudjanarko, S. W., Sugeng, & Wajdi, M. B. N. (2018). E-business, airport development and its impact on the increasing of information of communication development in indonesia. *Journal of Physics: Conference Series*, *1007*(1), 012046. https://doi.org/10.1088/1742-6596/1007/1/012046

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. *Scientometrics*, *126*(6), 5113–5142. https://doi.org/10.1007/S11192-021-03948-5/METRICS

Trivisonno, L. F., Escobar Liquitay, C., Vergara-Merino, L., Pérez-Bracchiglione, J., & Franco, J. V. A. (2022). Conceptos clave para la búsqueda de evidencia: una introducción para profesionales de la salud. *Medwave*, *22*(1), e8512. https://doi.org/10.5867/MEDWAVE.2022.01.002512

Vittori, A., Cascella, M., Leonardi, M., Monaco, F., Nocerino, D., Cuomo, A., Ottaiano, A., Perri, F., Mascilini, I., Francia, E., Petrucci, E., Marinangeli, F., & Picardo, S. G. (2022). VOSviewer-based bibliometric network analysis for evaluating research on juvenile primary fibromyalgia syndrome (JPFS). *Children*, *9*(5). https://doi.org/10.3390/CHILDREN9050637

Worldpopulationreview. (2024). *Air Conditioning Usage by Country 2024*. World Population Review. https://worldpopulationreview.com/country-rankings/air-conditioning-usage-by-country

Xia, C., Liu, L., Liu, Y., & Ma, Z. (2019). IPT system for tail-free household appliances in the smart home system. *IET Power Electronics*, *12*(5), 1002–1010. https://doi.org/10.1049/IET-PEL.2018.5488

Yan, L., & Zhiping, W. (2023). Mapping the literature on academic publishing: A bibliometric analysis on WOS. *SAGE Open*, *13*(1). https://doi.org/10.1177/21582440231158562/ASSET/IMAGES/LARGE/10.1177_21582440231158562-FIG7.JPEG

Zuhdi, U. (2014). The impacts of final demand changes on total output of Indonesian ICT sectors: An analysis using input-output approach. *IOP Conference Series: Materials Science and Engineering*, *58*(1), 012011. https://doi.org/10.1088/1757-899X/58/1/012011