

***A BIBLIOMETRIC ARTICLE REGARDING VIRTUAL REALITY
IN EDUCATION FOR 2018-2023***

TUGAS AKHIR

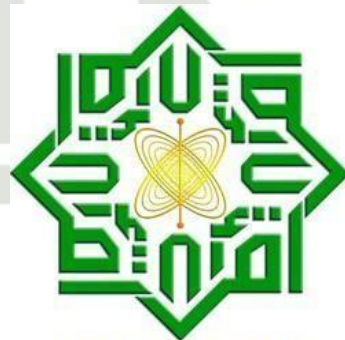
Diajukan Sebagai Salah Satu Syarat
untuk Memperoleh Gelar Sarjana Komputer pada
Program Studi Sistem Informasi



Oleh:

MELYANA SARI

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UIN SUSKA RIAU

UIN SUSKA RIAU

FAKULTAS SAINS DAN TEKNOLOGI

UNIVERSITAS ISLAM NEGERI SULTAN SYARIF KASIM RIAU

PEKANBARU

2024

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IN EDUCATION FOR 2018-2023*****TUGAS AKHIR**

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LEMBAR PERSEMBAHAN

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

Dengan menyebut nama Allah yang maha pengasih lagi maha penyayang

Assalamu 'alaikum Warahmatullahi Wabarakatuh.

Alhamdulillah Rabbil 'alamiin, segala puji bagi Allah Subhanahu Wa Ta'ala sebagai bentuk rasa syukur atas segala nikmat yang telah diberikan tanpa ada kekurangan sedikitpun. Shalawat beserta salam tak lupa pula kita ucapkan kepada Nabi Muhammad Shallallahu 'Alaihi Wa Sallam dengan mengucapkan Allahumma Shalli'ala Sayyidina Muhammad Wa'ala Ali Sayyidina Muhammad. Semoga kita semua selalu senantiasa mendapat syafaat-Nya di dunia maupun di akhirat, aamiin ya rabbal'aalamiin.

Saya persembahkan hadiah istimewa karya kecil ini sebagai salah satu bentuk bakti, rasa terima kasih, dan hormat kepada papa dan mama tercinta. Terima kasih yang tak terhingga karena telah merawat dan membesarkan saya dengan setulus hati dan penuh perjuangan hingga saya bisa sampai tahap ini. Berkat doa dan kasih sayang darimu, anakmu telah berhasil memperoleh gelar sarjana seperti yang telah engkau harapkan. Tiada apapun di dunia ini yang dapat membalas semua jasa-jasa dan pengorbananmu. Untuk itu, saya anakmu ini selalu mendoakan yang terbaik untuk papa dan mama agar bahagia dunia dan akhirat. Pastinya juga berteman kasih yang tak terhingga kepada saudara kandung tercinta yaitu kakak yang telah memberikan saya pelajaran dan pemahaman mengenai indahnya kehidupan yang damai sebagai saudara.

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Untuk sahabat terdekat yang tidak bisa disebutkan namanya satu persatu dan pastinya juga teman-teman seperjuangan, terima kasih berkat kalian masa perkuliahan menjadi lebih bermakna karena masa-masa yang kita lalui bersama akan selalu membekas sampai kapanpun. Semoga dimasa mendatang kita bisa bertemu lagi dalam keadaan yang lebih baik.

Wassalamu 'alaikum Warahmatullahi Wabarakatuh.

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KATA PENGANTAR

Alhamdulillah Rabbil 'Alamin, bersyukur kehadiran Allah *Subhanahu Wa Ta'ala* atas segala rahmat dan karunia-Nya sehingga peneliti dapat menyelesaikan Tugas Akhir ini. Shalawat serta salam kita ucapkan kepada Nabi Muhammad *Shalallahu 'Alaihi Wa Sallam* dengan mengucapkan *Allahumma Sholli'Ala Sayyidina Muhammad Wa'Ala Ali Sayyidina Muhammad*. Tugas Akhir ini dibuat sebagai salah satu syarat untuk mendapatkan gelar Sarjana Komputer di Program Studi Sistem Informasi Universitas Islam Negeri Sultan Syarif Kasim Riau.

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2. Bapak Dr. Hartono, M.Pd sebagai Dekan Fakultas Sains dan Teknologi.
3. Bapak Eki Saputra, S.Kom., M.Kom sebagai Ketua Program Studi Sistem Informasi.
4. Ibu Siti Monalisa ST., M.Kom sebagai Sekretaris Program Studi Sistem Informasi dan selaku koordinator Kerja Praktek Program Studi Sistem Informasi Fakultas Sains dan Teknologi Universitas Islam Negeri Sultan Syarif Kasim Riau.
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memberikan masukan dan saran yang sangat bermanfaat bagi penelitian ini.

1. Bapak Arif Marsal, Lc., MA sebagai Dosen Penguji kedua yang sudah memberikan masukan dan saran yang sangat bermanfaat bagi penelitian ini.
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16. Seluruh teman-teman Sistem Informasi Angkatan 2019.
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Pekanbaru, 15 Juli 2024

Peneliti,

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**INTERNATIONAL SYMPOSIUM ON INFORMATION
TECHNOLOGY AND DIGITAL INNOVATIONS (ISITDI) 2024**
Limau Manis, Pauh, Padang City, West Sumatra 25175
Website: <http://isitdi.conference.unand.ac.id/>



LETTER OF ACCEPTANCE

May 20, 2024

Dear Authors,

On behalf of the INTERNATIONAL SYMPOSIUM ON INFORMATION TECHNOLOGY AND DIGITAL INNOVATIONS (ISITDI) 2024's committee, we are pleased to inform you that your paper with registration number "1571023716", entitled:

"A Bibliometric Article Regarding Virtual Reality in Education for 2018-2023"

Written by "Melyana Sari"

has been reviewed and **ACCEPTED** for an oral presentation at the INTERNATIONAL SYMPOSIUM ON INFORMATION TECHNOLOGY AND DIGITAL INNOVATIONS (ISITDI) 2024.

We congratulate your achievement. The technical issues about the presentation will be informed later. Thank you very much for submitting and we look forward to your participation in the ISITDI 2024.

Kindest regard,

Chairman of ISITDI 2024

Dr. Eng. Ir. Budi Rahmadya, M.Eng

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A Bibliometric Article Regarding Virtual Reality in Education for 2018-2023

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Abstract— This bibliometric study examines the use of virtual reality (VR) in education from 2018 to 2023. The aim is to identify the main topics, authors, journals, most cited articles and relevant countries. This research uses the literature review method by analyzing 127 articles using Vos viewer and Biblioshiny. The results show that Spain and China are the leading contributors. Three main clusters of countries associated with VR in education are identified. The conclusion highlights the potential for further research, particularly in primary and secondary education and in developing countries. Despite the limitations of Scopus database data, the use of tools such as Vos viewer facilitates broader research avenues from sources such as Web of Science, Lens, PubMed, and Dimensions. This research lays the groundwork for further exploration of VR in education.

Keywords— bibliometric, education, virtual reality, publish or perish, VOS viewer

I. INTRODUCTION

In the current era, technology is transforming the way we learn and teach. Virtual Reality (VR) has emerged as an innovative tool with great potential to revolutionise education. With VR, students can experience immersive and interactive learning, opening up a new dimension to education that was previously unimaginable [1]. As VR continues to evolve, it becomes imperative to assess its effectiveness and explore its various applications in educational settings [2]. This emerging technology has the potential to transform traditional teaching methods, providing personalized and engaging learning experience for students and also offers students to understand challenging concepts in a more real and experiential way [3] To address problems, educators can use VR as an instructional medium. This allows students to interact with online environment through computer simulations [4].

When entering the world of VR, you gain access to an infinite learning environment where abstract concepts can be made tangible and elusive concepts can be explained visually and intuitively. Our research, which employs a systematic literature review method, supports the notion that VR not only motivates students to learn with greater enthusiasm but also enhances their understanding of the subject matter [5]. A systematic literature review is an ideal methodological approach to synthesise existing research, identify trends, and evaluate the impact of virtual reality (VR) technology on

education [6]. Moreover, systematic reviews of VR in education emphasize the importance of overcoming the challenges and leveraging this technology to improve learning outcomes [7]. As an emerging technology with a history dating back four decades, VR in education presents opportunities for deeper development, more engaging activities, and more varied forms of assessment [8]. The growing body of literature emphasize the need for further research and exploration of VR applications in education to maximize its potential [9].

This study identifies the current influence of virtual reality use in education, it also identifies the benefits and limitations of using virtual reality in education by conducting an in-depth bibliometric analysis of relevant articles published between 2018 and 2023. Bibliometric analysis provides valuable insights into the scientific literature on virtual reality (VR) in education [10]. Many studies have used bibliometric analysis to study the overview of VR in education by utilizing the Scopus database [11]. The purpose of this study is to identify the main topics, authors, journals, most cited articles, and countries related to Virtual Reality, Bibliometric, and Education. We searched for a total of 127 articles using Publish or Perish and then processed the data using VOS Viewer and Biblioshiny. By analyzing the literature on VR in education, bibliometric studies have highlighted the relevance and rise of VR in educational settings, indicating an increase in research interest and activity in this area [12].

II. LITERATURE REVIEW

A. Selecting a Template (Heading 2)

Bibliometric analysis is a quantitative method of analyzing published literature in a particular field or area of research [13]. It involves the use of bibliometric techniques to analyze various bibliographic elements of the literature, such as authorship, publication, citation, and keyword patterns [14]. The goal of a bibliometric literature review is to gain insight into the intellectual structure, trends, and impact of the field of study [15]. Bibliometric analysis in a literature review may include citation analysis, co-citation analysis, co-authorship analysis, journal analysis, keyword analysis, and visualization techniques [16]. These analysis help identify influential authors, highly cited papers,

collaborative networks, thematic clusters, emerging trends, and the overall structure of the research field [17].

B. Virtual Reality

Virtual Reality (VR) is an immersive technology that allows you to interact with an immersive environment [18]. VR uses specialized software and hardware such as VR headsets, motion controllers, and other sensors to create immersive and engaging experiences [19]. In terms of research, Virtual Reality has become an area of interest across multiple disciplines. Analysis using VR exploits the potential of this technology to create a simulated environment, different from the real world, in which various experiments and studies can be conducted [20].

C. Publish or Perish

Publish or Perish is a term that refers to software used by researchers and academics to help them measure and evaluate their research productivity based on the number and quality of their scientific publications [21]. The software is a very useful tool for researchers and is often used in the context of academic performance assessment [22]. The main purpose of Publish or Perish is to provide an overview of how much a researcher contributes to the generation of new knowledge through publications [23]. Based on publication data indexed in academic databases such as Google Scholar, Scopus or Web of Science, the software performs a bibliometric analysis [24].

D. VOS Viewer

VOS viewer is a software tool developed by Nees Jan van Eck and Ludo Waltman at the Center for Science and Technology Studies, Leiden University. It is used to construct and visualize bibliometric networks that can include journals, researchers, or individual publications based on citation, bibliographic coupling, co-citation, or co-authorship relationships [25], [26]. VOS viewer provides tools for clustering and mapping, which can help identify influential authors, highly cited papers, collaborative networks, thematic clusters, emerging trends, and the overall research landscape [27].

E. Systematic Literature Review

Systematic literature review is a method of careful search and analysis of all relevant literature in a field, with the aim of compiling and presenting in detail objective and comprehensive conclusions from existing research [28]. Literature reviews are an important part of academic research. Fundamentally, advances in knowledge must build on existing work [29]. To push the boundaries of knowledge, we need to know where the boundaries are. By reviewing relevant literature, we can understand the breadth of existing research and identify gaps that should be explored [30].

III. METHODOLOGY

This research methodology will discuss the explanation of the research stages as follows:

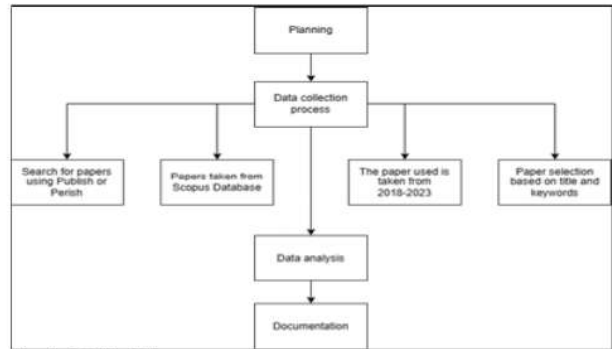


Fig 1. Methodology

A. Planning

This process starts by identifying problems based in papers that have been read from journals in Scopus. After identifying the problems, the next step is record the important information that was obtained. The information is then discussed with the lecturer and results are obtained that discuss the use of artificial intelligence using the systematic literature review method.

B. Data Collection

The first step in the data collection process is to search for papers that discuss virtual reality in education using the Publish or Perish tool. After entering Publish or Perish, select Scopus as the search database, then enter the range of paper years to be used as research data. This research data will include papers published from 2018 to 2023. The next step is to enter the keywords that will be used such as virtual reality, education, and bibliometrics in Publish or Perish

C. Data Analysis

The maximum amount of data that can be obtained from Publish or Perish, which comes from the Scopus database is 200 papers. Based on searches using the keywords virtual reality, education, and bibliometrics, 127 data were collected. From these data, 67 records were identified as article, 4 as book chapters, 26 as conference papers, 8 as conference reviews, and 22 as review. In this study, the data are analyzed and identified based on bibliographic analysis using VOS viewer.

D. Documentation

In this step, the collected and analyzed papers will be documented in the form of a literature review report that includes the research focus, research method used, data visualization using VOS viewer, advantages and disadvantages of VR in the world of education from previously analyzed articles.

< atau tinjauan suatu masalah.

IV. RESULT AND DISCUSSION

Based on initial screening of the use of Virtual Reality (VR) using the keywords virtual reality, bibliometrics and education, the data used in this study consisted of 127 records taken from Scopus database using Publish or Perish between 2018 and 2023. The data can be seen in Figure 2 below.

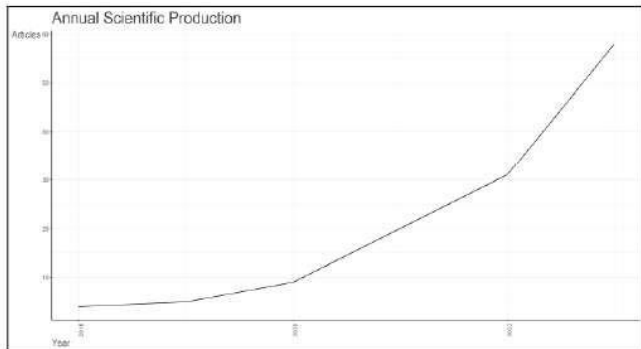


Fig 2. Annual scientific production

Figure 2 shows the increase in the number of articles published each year from 2018 to 2023. From this figure, we can see that the number of articles discussing the use of virtual reality increased significantly, starting in 2018 with 4 articles. In 2019, the frequency of increase was only 1 articles different from 2018, with a total of 5 articles. In 2020, there was 9 articles. The following year, the number doubled to 20 articles in 2021, followed by 31 articles in 2022 and 58 articles in 2023. From this data, we can see that the development of virtual reality is continuously increasing every year.

In presenting the different categories of bibliometric analysis results, the researchers followed a deductive path similar to the following by Ersozlu and Karakus (2019). The result have been presented in a way that starts from the more general findings and flows to the more specific ones, namely bibliographic coupling of countries, bibliographic coupling of organizations, bibliographic coupling of journals, bibliographic coupling of publications, and bibliographic coupling of authors. This content flow allows the reader to follow the relationships, starting with more general information and then finding specific information that explains the former [31].

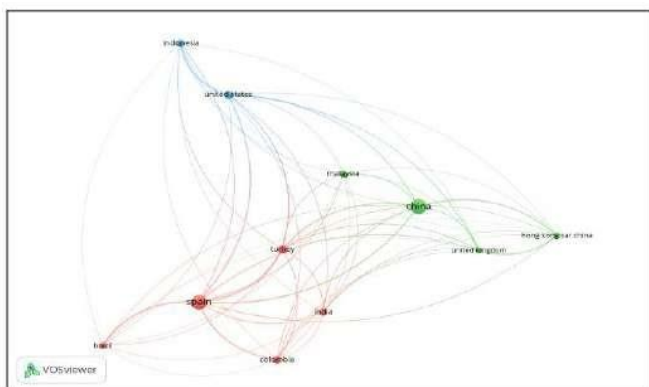


Fig 3. Coupling of the countries

Figure 3 shows the bibliographic coupling of the countries that are displayed in the network visualization. A country's minimum number of publications was 4. Of the 47 countries, 11 met the threshold. For all countries, the number

of publications, the number of citations, and the total link strength were calculated. The countries with the highest total link strength were selected. Number one was Spain with 17 publications, 452 citations, and 470 total link strength. For the other countries, the first number is the number of publications, the second is the number of citations, and the third is the total number of link strengths. The other countries were; China (19;113;406), United States (6;78;343), Turkey (6;242;319), United Kigdom (4;491;276), Hong Kong Sar China (4;440;245), Indonesia (5;15;185), Malaysia (5;33;166), Colombia (5;44;143), Brazil (4;14;134), India (5;29;123). In Figure 3, different colours indicate different clusters that were more frequently linked to each other. This means that studies from the countries in the same cluster cite each other more often. At the biggest cluster, there are Spain, Colombia, Turkey, India, Brazil. China, Malaysia, United Kigdom, Hong Kong Sar Cina are included at the second cluster. Indonesia and United States are at the third cluster.

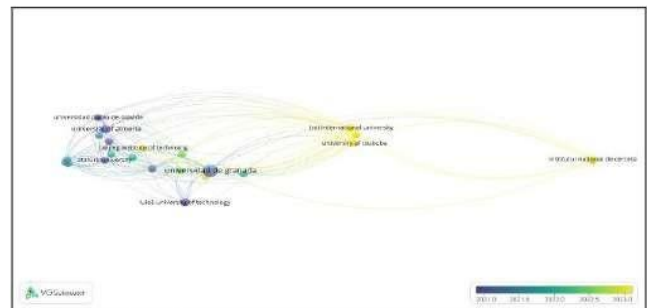


Fig 4. Coupling of the organizations

The bibliographic coupling of the organizations is shown in Figure 4 with an overlay visualization. Only the organizations that have the minimum number of 2 publications were included in the analysis. Of the 195 organizations, 24 met the threshold. For all these organizations, the total strength of the bibliographic coupling links and the number of publications and citations were calculated. The organizations with the highest total link strengths were selected. Inti International University (Malaysia), Universiti Malaysia Pahang (Malaysia), and University of Tsukuba (Japan) were the most influential organization in this list with 2 publications, 17 citations, and 505 total link strength. For the other organizations, the first number is the number of publications, the second is the number of citations, and the third is their total link strength: University of Almeria (Spain) (3;155;219), Universidad Pablo de Olavide (Spain) (2;90;193), Institución Universitaria Americana (Colombia) and Institución Universitaria Pascual Bravo (Colombia) (2;39;112), Universidad Eafit (Colombia) (2;39;112), Atatürk University (Turkey) (2;221;111), Universidad de Granada (Spain) (6;101;103), Necmettin Erbakan Üniversitesi (Turkey) (2;20;100), Luleå University of Technology (Sweden) and University of Eastern Finland (Finland) (2;144;90), Institutul Național de Cercetare - Dezvoltare Marină (Romania), National University of Political Studies (Romania) and Public Administration (Romania) (2;0;86), State University of Management (Russia) (2;1;81), Universitas Negeri Surabaya (Indonesia) (2;4;51), University of Alicante (Spain) (2;9;41), Beijing Institute of Technology (China) (2;1;39), Education University of Hong Kong (Hong Kong) (2;12;33), University of Technology Malaysia (Malaysia) (2;11;30), Central China Normal University (China) (2;22;14), Private University of the North (Peru) (2;0;2) and University of

Johannesburg (South Africa) (2;4;2). The colors in Figure 4 show the clustering of these universities according to the year of publication of the related studies. It shows that the most recent publications are from Inti International University (Malaysia), Universiti Malaysia Pahang (Malaysia), University of Tsukuba (Japan) the Institutul Național de Cercetare - Dezvoltare Marină and National University of Political Studies and Public Administration (Romania).

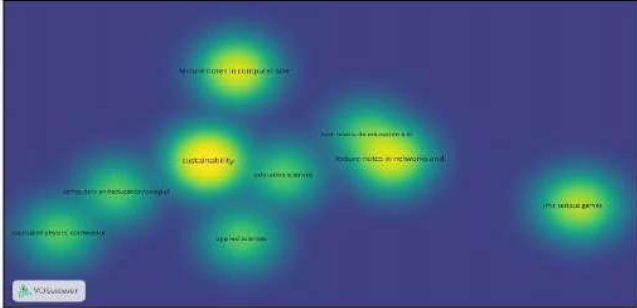


Fig. 5. Coupling of the journals

The bibliographic coupling of journals is shown in Figure 5 with density visualization. Inclusion criteria, a journal's minimum number of publications was 2. Of the 72 journals, 10 met the threshold. For those 10 journals, the number of publications, their citations, and their total strength were selected. In Figure 5, each circle represents a journal, and the density of the journal was represented by different colors. This density visualization was weighted by the number of publications for each journal. The colors that turn yellow indicate a higher number of publications for the journal. The number one is Sustainability with 8 publications, 175 citations, and 69 total link strength. For all journals, the first number is the number of publications, the second is the number of citations, and the third is the total link strength. The journal are; Education Sciences (2;91;35), Computers and Education (2;231;29), Applied Sciences (2;89;27), Red, Revista de Education a Distancia (2;12;24), Lecture notes in networks and systems (5;0;18), JMIR Serious Games (2;29;13), Nurse Education Today (2;22;12), Lecture Notes in Computer Science (5;8;9), and Journal of Physics: Conference Series (2;9;6)

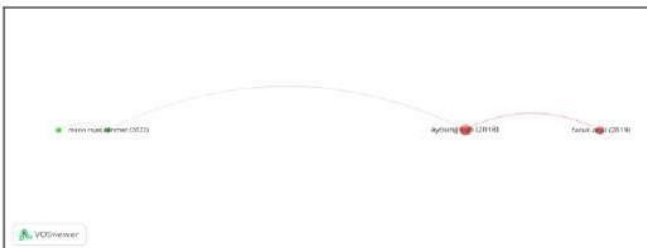


Fig. 6. Coupling of the publications

The bibliographic coupling of the publications is shown in Figure 6 with a network visualization. Only the highest total link strengths were selected. The strongest author were Antonio José Moreno Guerrero and Jesus Lopez Belmonte with 3 publications, 81 citations, and 407 total link strength. For all the authors, the first number stands for the number of publications, the second one is the number of publications that have a minimum number of 85 citations were included in this analysis. Of the 104 documents, 4 met the threshold. For all the publications, the number of citations and their total link strength were calculated. The publication with the

highest total link strength was Ayoung Suh (2018) with 411 citations and 11 total link strength. For each publication, the first number is the number of citations and the second is the total link strengths. The other publications are listed in order of their total link strength; Faruk Arici [2019; (218;9)], Mario Rojas Sanchez [2022;(106;4)], Friday Joseph Agbo [2021; (104;2)].

The most cited and most influential paper in this area is Ayoung Suh (2018). This review article conducts a systematic literature review on immersive technology research across different fields such as education, marketing, business, and healthcare. It reveals that there is a growing number of studies on immersive technology. However, more empirical research is needed to better understand the effects of immersive technology on user experience and performance, as these technologies are expected to become more widely used in the future. The article also identifies gaps in the future literature and provides suggestions for future research directions, including specific research tasks. Overall, this study highlights the importance of continued research in the area of immersive technology and its impact on various domains.

The second most influential publication is Faruk Arici (2019). In this article, the content analysis and bibliometric result of article on the use of augmented reality in science education were examined to show research trends over the past six years. It was found that mobile apps and marker-on-paper materials are the most preferred types of material for augmented reality, as these types of materials are easy to use and can be easily and practically developed.

The third influential article is Mario Rojas Sanchez (2022). This article aims to identify and analyze the scientific literature with a bibliometric analysis to find the main topics, authors, sources, most cited articles, and countries in the literature on virtual reality in education. The other aim is to understand the conceptual, intellectual, and social structure of the literature on the subject and identify the knowledge base of the use of VR in education.

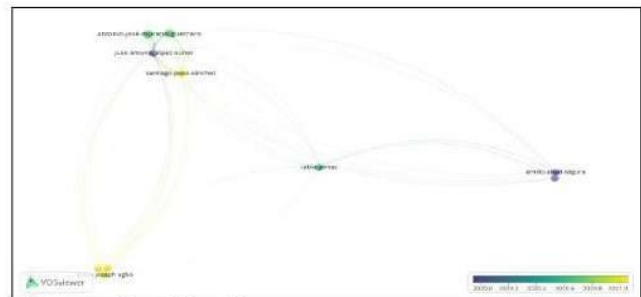


Fig. 7. Coupling of the authors

The bibliographic coupling of the authors is shown in Figure 7 with an overlay visualization. An author's minimum number of publications was 2 and author's minimum number of 45 citations were included in this analysis. Of the 369 authors, 10 met the thresholds. For all the authors, the number of publications, the number of citations, and their total link strengths were calculated. The authors with the citations, and the third one is the total link strengths. The rest of the authors are presented in order; Juan Antonio López Núñez (2;68;327), Emilio Abad Segura and Mariana Daniela Gonzalez Zamar (2;107;255), Santiago Pozo Sánchez (2;56;235), Friday Joseph Agbo, Jarkko Suhonen and

DISCUSSION

This paper searched publications on virtual reality in education in Scopus database. There are 127 articles using Publish or Perish and data processing using VOS Viewer and Biblioshiny. Related to this, bibliographic coupling of the countries, bibliographic coupling of the organizations, bibliographic coupling of the journals, bibliographic coupling of the publications, and bibliographic coupling of the authors were analyzed and visualized.

The result of the bibliographic coupling of the countries showed that the most influential country of origin in this area was Spain and the second was China. The other major countries were: United States, Turkey, United Kingdom, Hong Kong Sar China, Indonesia, Malaysia, Colombia, Brazil, India. Studies from the Spain, Taiwan, Turkey, Canada, and Mexico clusters had more links than the rest of the list. The second cluster consisted of China, Malaysia, United Kingdom and Hong Kong Sar China. The last cluster, Indonesia and the United States, were often linked to each other.

In terms of bibliographic coupling, the most influential author in this area of research has been Antonio-Jose Moreno-Guerrero and Jesus Lopez Belmonte from Spain. The other important authors were Juan Antonio López Núñez and Emilio Abad Segura from Spain, Mariana Daniela Gonzalez Zamar (Argentina), Santiago Pozo Sánchez (Spain), Friday Joseph Agbo (Nigeria), Jarkko Suhonen (Finlandia) Solomon Sunday Oyelere (Nigeria), and Rabia Yilmaz (Turkey). Spain has the most strong authors.

The results related to the bibliographic coupling of the organizations in this is has been Inti International University (Malaysia), Universiti Malaysia Pahang (Malaysia), and University of Tsukuba (Japan). Among the most influential institutions in this area of research, Malaysia has some top universities on this list, but Spain is the country with the most VR articles on this list.

Virtual reality (VR) is a new technology used in education and other fields. Research in this area is growing and getting more advanced. The researchers posit that countries that invest in these technologies will experience greater benefits than others. The study says that VR is no longer just an idea. It is a practical technology that is needed now. There is still a lot of potential for exploring, understanding, and testing VR. VOS viewer is used in bibliometric analysis to show how VR is used in many fields, including education, medicine, health, and business.

CONCLUSION

Based on the results and discussion, it is concluded that the countries Spain and China (based on the bibliographic coupling of the countries), Inti International University (Malaysia) (based on the bibliographic coupling of the organizations), Sustainability (based on the bibliographic coupling of the journals), Ayung Suh (2018) (based on the bibliographic coupling of the publications), José Moreno Guerrero and Jesus Lopez Belmonte (based on the bibliographic coupling of the authors) are the most influential in the field of Virtual Reality in higher education

or universities. Immersive technology and metaverse are keyword that often appear in this research. Then this research only takes the use of Virtual Reality within the scope of the university and the data is limited because it uses the Scopus Database only. This means that this is a gap that can make writers, readers and researchers in this field can do further research. Therefore, for further research it is recommended that it discuss the field and in other fields of education using more sources such as Web of Science, Dimensions, Lens, and PubMed.

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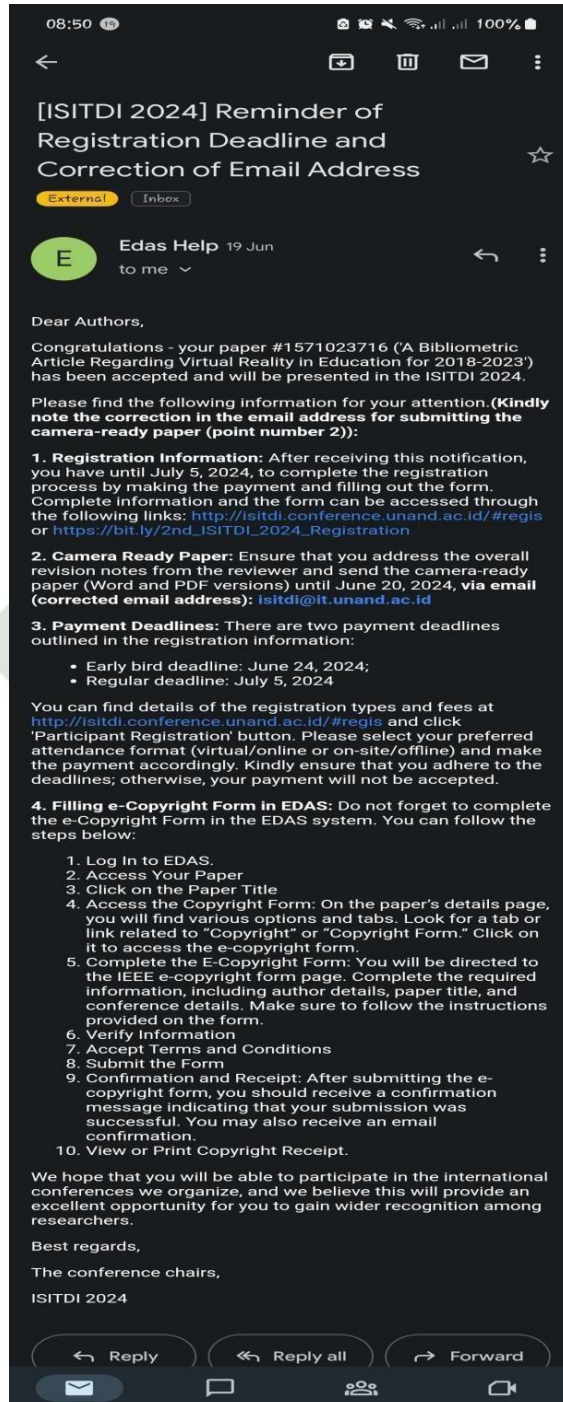
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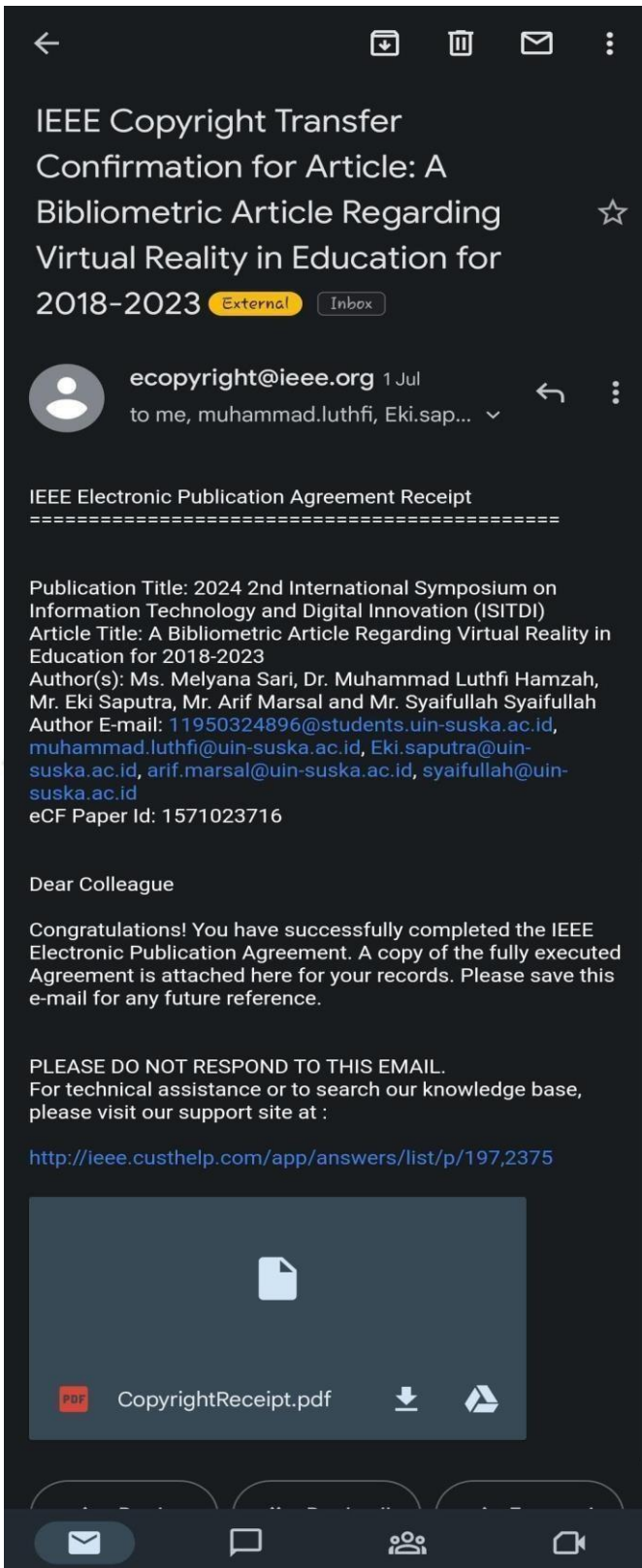


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Detailed comments

The article provides valuable insights into the research landscape of virtual reality in education through a bibliometric analysis. However, the authors need to clarify the specific research questions or objectives addressed in the study to provide a clear focus for the reader in introduction section. Then, include a section outlining the methodology in more detail, such as the search strategy, inclusion criteria, and data analysis techniques. Double check the sections of the manuscript, there is no conclusion section. The conclusion part is essential to give readers a quick overview of the key outcomes of the study.

completed	Good	4 Solid work of notable importance.	4 Significant original work and novel results.
			Well written 4

Detailed comments

Technical Content:
 Expand Database Sources: While Scopus is a significant source, incorporating additional databases such as Web of Science, PubMed, or Dimensions can enhance the robustness of the findings.
 Detailed Methodology: Provide more detail on the criteria for article inclusion and exclusion. Describe the specific search queries used and the rationale behind the selection of keywords.
 Comprehensive Analysis: Include more detailed analyses on the impact of VR in specific educational contexts (e.g., primary, secondary, higher education). Also, consider qualitative insights or case studies to complement the quantitative data.

Presentation:
 Figures and Tables: Ensure all figures and tables are clearly labeled and include detailed captions that explain the visualized data. For instance, in Figure 2 showing annual scientific production, a brief explanation of the trends observed would be beneficial.
 Clarity and Consistency: Maintain consistent terminology throughout the paper. For example, if using "bibliometric coupling" and "co-citation analysis," ensure these terms are defined early and used consistently.
 Abstract and Conclusion: Strengthen the abstract and conclusion sections by summarizing key findings more explicitly and suggesting specific future research directions based on the analysis.
 References and Citations: Ensure all references are up-to-date and properly formatted. Include DOI numbers where possible to facilitate easy access to the sources.

completed	Average	3 Marginal work and simple contribution. Some flaws.	2 Minor variations on a well investigated subject.
			2 Readable, but revision is needed in some parts.
			3

Detailed comments

- Improve your paper article writing, because your article has 35% similarity.
- Improve the way of writing captions on images. Look again at the writing example in the template provided
- Some figures in this paper are unclear. Please improve the image quality so that readers can see it clearly
- Also improve how to write figure citations in paragraphs. Look again at the writing example in the template provided
- Please neatly write references, align left and right.
- The introduction section does not explain comprehensively the importance of VR in the field of education. Please add relevant references regarding this
- In the Data Collection section, the author has not explained how and what queries are used in Publish or Perish to collect the desired data
- Please also explain the limitations in data collection, namely inclusion and exclusion in data collection



DAFTAR RIWAYAT HIDUP



UIN Suska Riau

State Islamic University of Sultan Syarif Kasim Riau

Melyana Sari dilahirkan di Duri pada tanggal 31 Maret 2001 dari pasangan seorang Papa Syarifuddin dan Mama Desmawirza, merupakan anak terakhir dari 2 bersaudara. Peneliti bertempat tinggal di Duri Kecamatan Mandau, Kabupaten Bengkalis, Riau. Pada tahun 2006 peneliti memulai pendidikan dengan masuk TK Al-Khadajah di Kota Duri dan lulus pada tanggal 28 Juni 2007. Lalu peneliti melanjutkan pendidikan Sekolah Dasar di SD Negeri 12 Air Jamban. Peneliti menyelesaikan pendidikan Sekolah Dasar pada tanggal 8 Juni 2013. Peneliti juga telah menyelesaikan pendidikan Diniyah Takmiliah Awwaliyah pada tanggal 20 Mei 2013. Peneliti melanjutkan pendidikan tingkat SLTP di SMP Negeri 17 Mandau yang selesai pada tanggal 11 Juni 2016. Peneliti melanjutkan tingkat SLTA di SMA Negeri 8 Mandau. Setelah peneliti menyelesaikan pendidikan di SMA Negeri 8 Mandau pada tanggal 13 Mei 2019, peneliti pun melanjutkan pendidikan dengan menjadi mahasiswa pada Program Studi Sistem Informasi Fakultas Sains dan Teknologi Universitas Islam Negeri Sultan Syarif Kasim Riau dan peneliti menyelesaikan kuliah Strata Satu (S1) tersebut pada tahun 2024.

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