

**INFORMATION AND COMMUNICATION  
TECHNOLOGY (ICT) INTERVENTION TARGETING PHYSICAL  
ACTIVITY AND DIET BEHAVIORS IN PEOPLE WITH  
DISABILITIES: VOSVIEWER MAPPING ANALYSIS**

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**Abstract**

This study aimed to investigate the development and the evolution of physical activity, technology, nutrition, and special needs as one unit of research based on the distribution of bibliometric maps and research trends on google scholars' data using VOSviewer software. The study analysed was taken from the Google Scholar database of 996 publications; the data is the complete peer-reviewed journal databases. The literature search was conducted online on December 21, 2022, with the keyword "Information and Communication Technology, physical activity, Diet, and Disabled People" according to the criteria ' titles, keywords, and abstract (topic area). The period used in this sampling considers the topic of physical activity is between 2020-2022. In the initial search, the chosen threshold found 2678 terms related to Information and Communication Technology, physical activity, Diet, and Disabled People. There were 378 terms of literacy related to the topic, and 257 terms of articles were determined that are most relevant to the topic of Information and Communication Technology, physical activity, Diet, and Disabled People. The sample articles used were downloaded in the form of \*.csv and then processed using Microsoft Excel to view the distribution of the article citation data. The article is also downloaded in \*.ris format and processed using HistCite 12.3 software to facilitate data analysis. These Bibliometric approaches were used to identify the scope of knowledge and research that has been done and help determine novelty in conducting further research. The limitation of this research is no systematic analysis of the subject, country, and country income. The results of this study are expected to contribute to further publications so that they always follow trends in Information and Communication Technology, physical activity, Diet, and Disabled People research that are following the needs of people's lives.

Keywords: Bibliometric analysis, Diet, Disabled people, ICT, Physical activity.

## 1. Introduction

Human beings with disabilities face some challenges in today's society [1-3]. in line with the commission of Europe, persons with disabilities can work in various fields according to their abilities and level of disability and the average absorption of workers involving persons with disabilities is 48%. However, only 27.8% of persons with disabilities can obtain education up to the diploma or bachelor's degree level. Meanwhile, around 70% of persons with disabilities are in poverty and face problems related to social inclusion [4]. Services and support for the problems of people with disabilities are also seen as still very minimal. for example, access to transportation, buildings or offices, access to data, communications, and to various public facilities that are difficult for persons with disabilities to access independently. This causes them to continue to depend on family and helpers. And, it is difficult for them to join socially in the general community [5]. In recent times there has been an increase in support for persons with disabilities. However, partially towards certain aspects, there is still no progress. Aspects of fitness, education, and work remain problems for people with disabilities that have not yet been resolved. Meanwhile, laws that facilitate persons with disabilities cannot be implemented optimally. The development of equal rights for persons with disabilities still cannot be realized, especially in terms of access to technology products such as computers, the internet, mobile phones, and so on. one of the hopes to be realized is that people with physical, visual, speech and hearing impairments can participate in enjoying technological advances. Like normal people, people with disabilities also hope to be able to do jobs online such as searching for health information, and food, using software, the internet, and so on [6].

Apart from accessibility issues, people who fall into this category of disabilities also face health problems resulting from physical inactivity because of their limitations. physical activity is a fundamental issue of public health structures modeling the public health center features of evaluation, coverage improvement, and assurance. however, people with disabilities have frequently not been included in general fitness to assess, expand rules, or compare the effect of physical activity interventions to sell health and prevent sickness among people with disabilities. Existing surveillance structures for physical activity most often investigate individuals' cardio-physical activity (PA) behaviors. They have been used to reveal secular adjustments within the populace levels of PA over the years [7, 8]. Surveillance can also be used to reveal the factors which can influence changes in the PA degrees. The status of world surveillance of Physical activity among disabled populations has been a lot over the past years, concerning international efforts to measure physical activity occurrence and the impact of physical inactivity on fitness effects, health outcomes, healthy lifestyle, and mortality. The recent occurrence estimates of Physical Activity among people with disabilities come nearly solely from many high-income countries (HIC), such as those in North the USA, Western Europe, and Scandinavia [9-11]. There are incidence estimates for Physical Activity among disabilities from Low Middle-Income Countries (LMIC), but those are limited to a small variety of countries [12, 13]. The problem of low physical activity related to public health does not only occur in people with disabilities but also occurs in many normal people both physically and mentally. it's just that people with disabilities have a higher risk, due to their physical or mental limitations.

Health problems are closely related to habits and lifestyle. lifestyle behaviors consisting of eating behavior, physical activity, and sedentary behavior are key

modifiable danger factors for health, especially for disabled people. Enhancing those behaviors is taken into consideration as crucial to decreasing the monetary and health burden of people with disabilities. The worldwide Burden of disease observation estimated that in 2015, greater than 13.5 million deaths (24%) were resulting from nutritional threat factors (along with excessive salt/sodium consumption and occasional consumption of wholegrains and fruits) and physical inactivity [14]. Proof-based tips to assist prevent the progression of NCDs and reduce mortality consequently encourage the adoption of wholesome lifestyle behaviors [15, 16]. The development of strategies to sell physical hobbies and healthy weight-reduction plans is an important assignment. people with special needs need a lot of help and access to support their health, including matters relating to active and healthy habits and lifestyles, also their eating behavior. One way to make it easier to provide information about what they need to support their health is access to the internet, social media, and all kinds of information and communication technology or other digital technologies.

Information and communication technology (ICT) have been described as a facilitator for social inclusion because it permits the shipping of actual-time offerings which can help people to examine, paintings, tour, socialize, store, and engage with the community without being problems with physical obstacles [8, 17, 18]. ICT has also been diagnosed as one of the important factors that can contribute to reducing social inequalities for people with disabilities. This can be used as a way to inspire and guide social inclusion, so they have the motivation and increase their self-confidence to be able to grow and join in a normal society [19]. However, for certain purposes, the implementation of ICT has not been fully realized. therefore, entirely technology-based applications are still not used as general advocates in supporting social inclusion for persons with disabilities. Increasingly people depend on and feel the need for activities to carry out the basic components of everyday life, such as how they socialize, talk, learn, take care of themselves, and interact with the environment. hence, it is increasingly important for persons with disabilities to gain access to technology. However, consequently, it requires quite expensive costs to be able to access these needs easily. Although several unique information technologies have been used to develop support systems for the needs of persons with disabilities [4], only a few empirical studies have been conducted to review technological developments and expand programs used to make it easier for persons with disabilities to carry out their daily activities. Several studies [20-22] show that despite various emerging technologies that have been counselled to help persons with disabilities, the aim of identifying disturbing symptoms to be able to enter society normally has not been resolved. The results of the study also found that there were still few findings that examined the carrying capacity of technology in supporting people belonging to social inclusion disabilities [20-22].

A based literature overview using numerous formal quotation community analysis methods has been accomplished. Still, the consequences are nonetheless very restricted and no longer show the evolution and spread of work on physical activity, technology, nutrition, and special needs as one unit. those factors can impact the characteristics and developments in research and publications on this subject, thereby causing gaps in information between knowledge of the literature and sensible situations inside the discipline of physical activity and technology. This study aimed to investigate the development and the evolution of physical

activity, technology, nutrition, and special needs as one unit of research based on the distribution of bibliometric maps and research trends on google scholars' data using VOSviewer software. By using the method offered in this paper, bibliometrics can carry out state-of-the-art cluster analyses without the need to have a deep understanding of clustering strategies and without requiring superior computer capabilities. Bibliometrics are sensible for supplying information used by researchers, stakeholders, or policymakers to improve the excellence of studies. Bibliometrics is a statistical approach that can analyse quantitative research concerning a particular subject matter thru mathematical means. This analysis can also check the exceptional of studies, examine the main areas of research and expect the direction of destiny studies. however, till now, there are only a few published bibliometric analyses of physical activity because physical pastime is one of the important subjects in assisting human life, bibliometric analysis is needed, and enough appropriate references must be obtained.

## **2. Method**

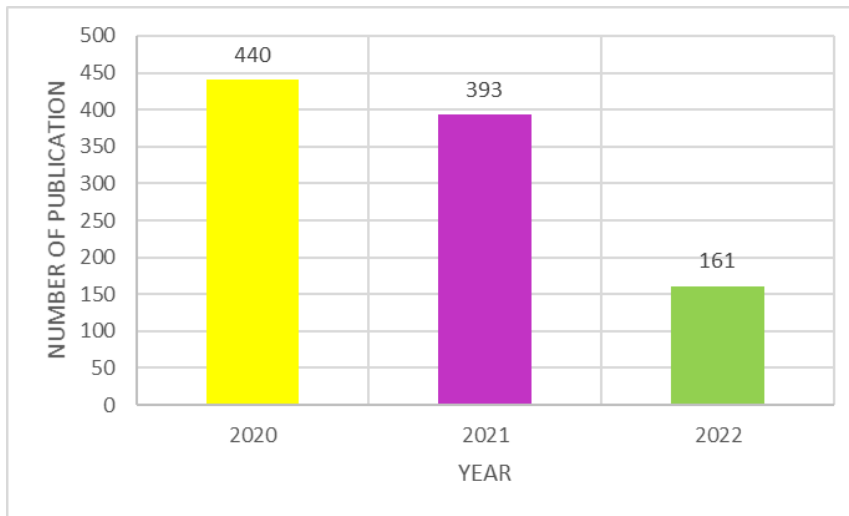
The study analysed was taken from the Google Scholar database of 996 publications; the data is the complete peer-reviewed journal databases. The literature search was conducted online on December 21, 2022, with the keyword "Information and Communication Technology, physical activity, Diet, and Disabled People" according to the criteria ' titles, keywords, and abstract (topic area). The period used in this sampling considers the topic of physical activity is between 2020-2022. In the initial search, the chosen threshold found 2678 terms related to Information and Communication Technology, physical activity, Diet, and Disabled People. There were 378 terms of literacy related to the topic, and 257 terms of articles were determined that are most relevant to the topic of Information and Communication Technology, physical activity, Diet, and Disabled People. The sample articles used were downloaded in the form of \*.csv and then processed using Microsoft Excel to view the distribution of the article citation data. The article is also downloaded in \*.ris format and processed using HistCite 12.3 software to facilitate data analysis. Moreover, records evaluation is the use of VOSviewer for visualization and fashion evaluation in the form of bibliometric mapping. VOSviewer can create publication maps, country maps, and journal maps primarily based on networks (co-citation), build keyword maps based on shared networks, and create a map with a couple of objects. The quantity of keywords used can be adjusted to your liking, and less relevant keywords can be removed. statistics mining, mapping, and grouping of articles taken from the database may be achieved with the use of the VOSviewer software program. Detailed information on how to search articles and how to use VOSviewer are explained in previous studies [23, 24]. Examples of the use of bibliometric are shown in previous studies [25-45].

## **3. Results and Discussion**

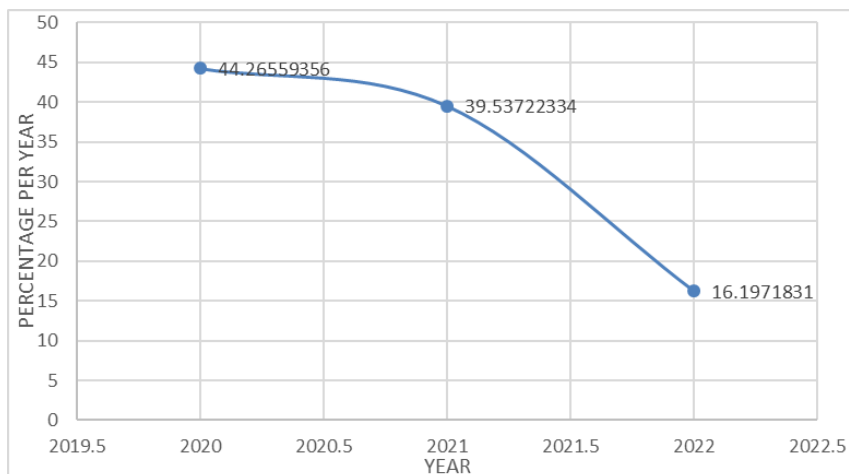
### **3.1. Distribution of number of publications by year period**

Physical activity publications based on the publication year between 2020-2022 experienced a significant decline. Between 2020-2021 publications in the area of Information and Communication Technology, physical activity, Diet, and Disabled People" experienced a 3,7 percent decrease or about 47 publications, but from 2021 to 2022 there was a significant decrease in the number of publications it is about

24 percent decrease equal to 232 publications. This is related to the occurrence of the Covid 19 pandemic in all parts of the world, which causes research in the area of Information and Communication Technology, physical activity, Diet, and Disabled People to be hampered; this has an impact on the publication of scientific articles in that area. The distribution of the data can be seen in Figs. 1 and 2.



**Fig. 1. The distribution of information and communication technology, physical activity, diet, and disabled people by year.**



**Fig. 2. Percentage of the distribution of information and communication technology, physical activity, diet, and disabled people by year.**

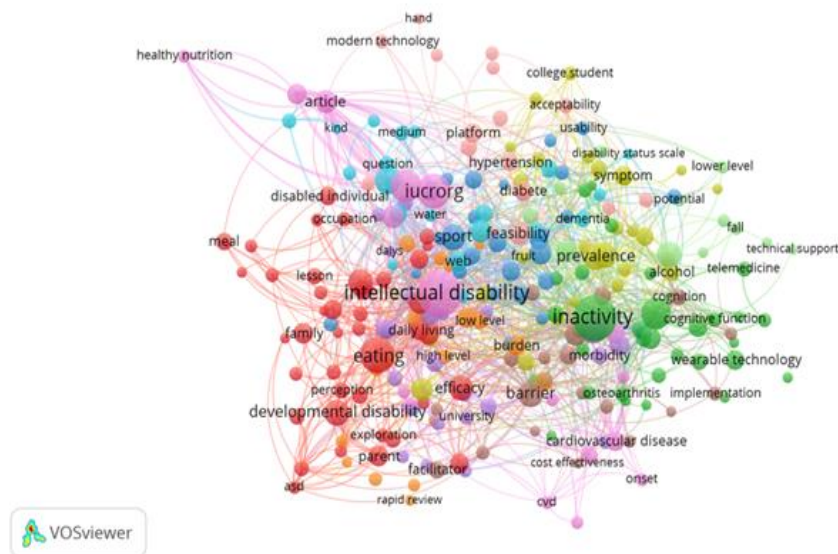
### 3.2. Visualization of topic areas based on VOSviewer

The result extracted from titles, keywords, and abstracts found 996 documents consisting of 440 documents in 2020, 393 documents in 2021, and 161 documents in 2022. The minimum number of relationships with terms in the use of VOSviewer

was set in 5 terms. After being analysed using VOSviewer 11 clusters showed the relationship between one topic to another. The thickness of the connecting line indicates the strength of the topic field or keyword pair. Regardless of groups and lines, node size indicates the frequency with which a keyword or topic occurs. In bibliometric analysis, VOSviewer can display 3 different mapping visualizations, namely Fig. 3 (network visualization), Fig. 4 (overlay visualization), and Fig. 5 (density visualization). which will be explained below.

### 3.3. Topic areas based on VOSviewer using network visualization

In bibliometric research, topic mapping is one of the important things. All topics regarding the keywords of physical activity, in general, can be seen in Fig. 3.



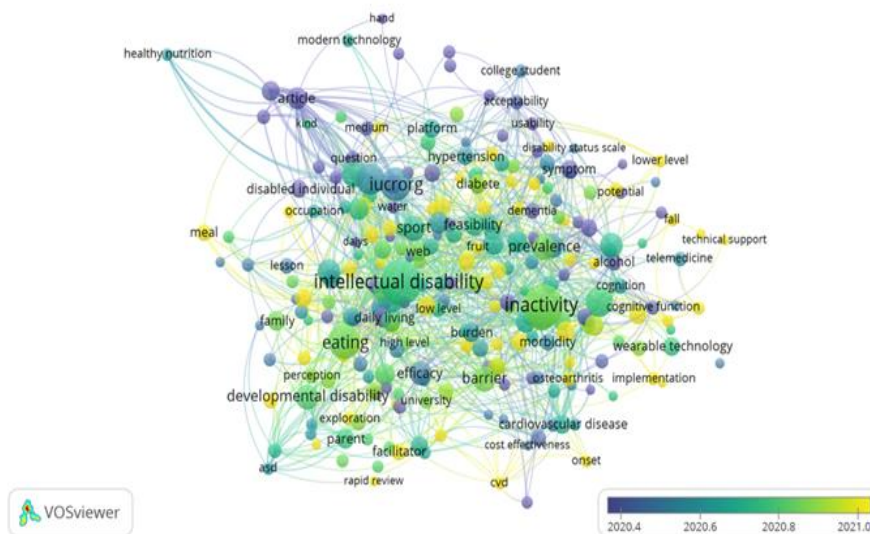
**Fig. 3. The network visualization of literacy topic area.**

Figure 3 shows 11 clusters related to the research topic. Cluster 1 is in red colour consisting of 41 item topics, the most dominant term is 'Eating' connected to 57 other terms including Intellectual disability and assistive technology. Total link strength of 81 and occurrences of 37. Cluster 2 is in green colour and consists of 33 item topics, the most dominant term is 'Inactivity' connected to 86 other terms including Intellectual disability and Exercise Training. Total link strength of 135 and occurrences of 60. Cluster 3 is in blue colour consist of 28 item topics, the most dominant term is 'Sport' connected to 33 other terms including Healthy lifestyle and assistive technology. Total link strength of 42 and occurrences of 20. Cluster 4 is in yellow and consists of 28 item topics, the most dominant term is 'Prevalence' connected to 44 other terms including Inactivity and Anxiety. Total link strength of 60 and occurrences of 20. Cluster 5 is in purple and consists of 23 item topics, the most dominant term is 'ICT' connected to 25 other terms including Intellectual status and Communication technology. Total link strength of 29 and occurrences of 15. Cluster 6 is in the Tosca colour and consists of 20 item topics, the most dominant term is 'Physical Education' connected to 30 other terms including

Healthy Status and Sport. Total link strength of 39 and occurrences of 22. Cluster 7 is in orange colour and consists of 19 item topics, the most dominant term is 'Burden' connected to 12 other terms including PA program and Health Literacy. Total link strength of 12 and occurrences of 16. Cluster 8 is in brown and consists of 19 item topics, the most dominant term is 'Barrier' connected to 32 other terms including PA participation and Behavior. Total link strength of 46 and occurrences of 21. Cluster 9 is in pink colour and consists of 17 item topics, the most dominant term is 'Intellectual Disability' connected to 89 other terms including Healthy Nutrition and IUCORG. Total link strength of 171 and occurrences of 64. Cluster 10 is in light brown and consists of 17 item topics, the most dominant term is 'Acceptability' connected to 22 other terms including Daily PA and modern technology. Total link strength of 81 and occurrences of 37. Cluster 11 is in light green and consists of 12 item topics, the most dominant term is 'Mobility Disability' connected to 15 other terms including Nutrition examination and technical support. Total link strength of 15 and occurrences of 8.

### 3.4. Topic areas based on VOSviewer using overlay visualization

Visualization of topic areas based on VOSviewer using Overlay Visualization shows trends related to research topic areas or keywords from year to year. The colors in the keywords indicate the research period; research trends on the topic of Information and Communication Technology, physical activity, Diet, and Disabled People are primarily carried out between 2020 and early 2021. Overlay Visualization on the subject of physical activity is shown in Fig. 4.

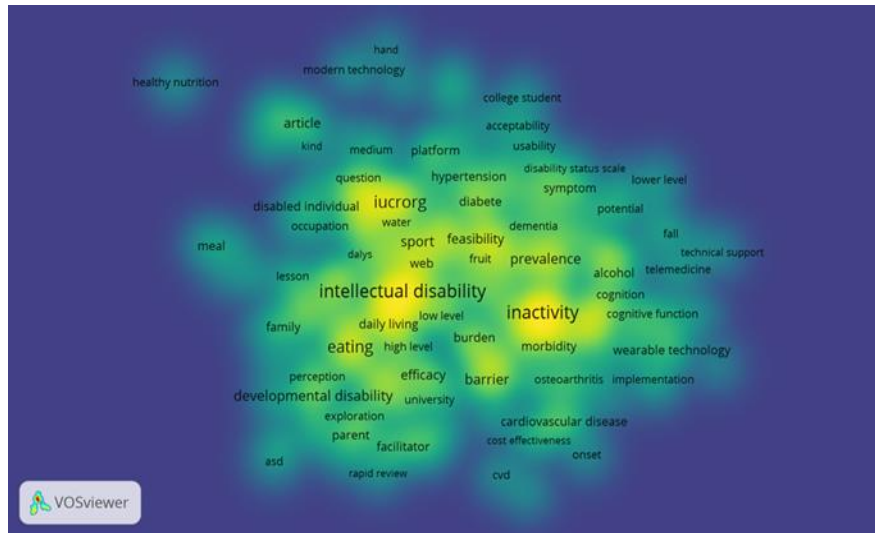


**Fig. 4. The overlay visualization of literacy topic area.**

### 3.5. Topic areas based on VOSviewer using density visualization

The depth of research related to the topic area can be shown by the darker the colour, the more researchers conducting research related to the topic area. The

depth of research related to the topic area of Information and Communication Technology, physical activity, Diet, and Disabled People can be seen in Fig. 5.



**Fig. 5. The density visualization of literacy topic area.**

#### 4. Conclusions

This bibliometric analysis reveals the characteristics and trends of the literature on Information and Communication Technology, physical activity, Diet, and Disabled People published between 2020-2022 using the Scopus database.

The development and the evolution of research in the area of physical activity and its relationship with other variables. Research and publications in the field of Information and Communication Technology, physical activity, Diet, and Disabled People have fluctuated, there has even been a significant decline between 2021-2022. Most of the publications are the results of research or original articles which is around 80%, the rest are non-research articles.

Based on the network visualization of the literacy topic Area, the clusters that have been studied and are most correlated with the topics are physical activity programs, assistive technology, and Functional disability. Publications regarding research on Information and Communication Technology, physical activity, Diet, and Disabled People related to this topic were mostly carried out between 2020 and early 2021. These Bibliometric approaches were used to identify the scope of knowledge and research that has been done and help determine novelty in conducting further research.

The limitation of this research is no systematic analysis of the subject, country, and country income. But this article attempts to configure and visualize the sharing of literature systematically and analyse it through a bibliometric approach.

The results of this study are expected to contribute to further publications so that they always follow trends in Information and Communication Technology, physical activity, Diet, and Disabled People research that are following the needs of people's lives. Thus, the research and publications carried out will always be up



to date and able to solve problems that occur, especially in the field of physical activity and health.

## References

1. Burrell, A.; Ives, J.; and Unwin, G. (2017). The experiences of fathers who have offspring with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 47(4), 1135-1147.
2. McLaren, J.; Lichtenstein, J.D.; Lynch, D.; Becker, D.; and Drake, R. (2017). Individual placement and support for people with autism spectrum disorders: A pilot program. *Administration and Policy in Mental Health and Mental Health Services Research*, 44(3), 365-373.
3. Hanif, S.; Peters, H.; McDougall, C.; and Lindsay, S. (2017). A systematic review of vocational interventions for youth with physical disabilities. *Emerald Publishing Limited*, 181-202.
4. Manzoor, M.; and Vimarlund, V. (2018). Digital technologies for social inclusion of individuals with disabilities. *Health and Technology*, 8(5), 377-390.
5. Domingo, M.C. (2012). An overview of the Internet of Things for people with disabilities. *Journal of Network and Computer Applications*, 35(2), 584-596.
6. Cheatham, L.P. (2012). Effects of internet use on well-being among adults with physical disabilities: A review. *Disability and Rehabilitation: Assistive Technology*, 7(3), 181-188.
7. Carlson, S.A.; Fulton, J.E.; Schoenborn, C.A.; and Loustalot, F. (2010). Trend and prevalence estimates based on the 2008 Physical Activity Guidelines for Americans. *American Journal of Preventive Medicine*, 39, 305-313.
8. Moore, L.V.; Harris, C.D.; Carlson, S.A.; Kruger, J.; and Fulton, J.E. (2012). Trends in no leisure-time physical activity-United States, 1988-2010. *Research Quarterly for Exercise and Sport*, 83, 587-591.
9. Brown, D.R.; Carroll, D.D.; Workman, L.M.; Carlson, S.A.; and Brown, D.W. (2014). Physical activity and health-related quality of life: US adults with and without limitations. *Quality of Life Research*, 23, 2673-2680.
10. Carroll, D.D.; Courtney-Long, E.A.; Stevens, A.C.; Sloan, M.L.; Lullo, C.; Visser, S.N.; Fox, M.H.; Armour, B.S.; Campbell, V.A.; Brown, D.R.; et al. (2014). Vital signs: Disability and physical activity—United States, 2009-2012. *Morbidity and Mortality Weekly Report*, 63, 407-413.
11. De Hollander, E.L.; and Proper, K.I. (2018). Physical activity levels of adults with various physical disabilities. *Preventive Medicine Reports*, 10, 370-376.
12. Mat Rosly, M.; Halaki, M.; Hasnan, N.; Mat Rosly, H.; Davis, G.M.; and Husain, R. (2018). Leisure time physical activity participation in individuals with spinal cord injury in Malaysia: Barriers to exercise. *Spinal Cord*, 56, 806-818.
13. Oyeyemi, A.L.; Oyeyemi, A.Y.; Omotara, B.A.; Lawan, A.; Akinroye, K.K.; Adedoyin, R.A.; and Ramirez, A. (2018). Physical activity profile of Nigeria: Implications for research, surveillance and policy. *The Pan African Medical Journal*, 30, 175.
14. Collaborators, G.B.D.; Forouzanfar, M.H.; Alexander, L.; Bachman, V.F.; Biryukov, S.; Brauer, M.; and Chen, Z. (2015). Global, regional, and national comparative risk assessment of 79 behavioural, environmental and

- occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: a systematic analysis for the global burden of disease study 2013. *The Lancet*, 386(10010), 2287-2323.
15. Beaglehole, R.; Bonita, R.; Horton, R.; Adams, C.; Alleyne, G.; Asaria, P.; Baugh, V.; Bekedam, H.; Billo, N.; Casswell, S.; Cecchini, M.; Colagiuri, R.; Colagiuri, S.; Collins, T.; Ebrahim, S.; Engelgau, M.; Galea, G.; Gaziano, T.; Geneau, R.; Haines, A.; and Lancet NCD Alliance (2011). Priority actions for the non-communicable disease crisis. *Lancet (London, England)*, 377(9775), 1438-1447.
  16. Pedersen, B.K.; and Saltin, B. (2015). Exercise as medicine-evidence for prescribing exercise as therapy in 26 different chronic diseases. *Scandinavian Journal of Medicine and Science in Sports*, 25, 1-72.
  17. Brunner, M.; Hemsley, B.; Togher, L.; and Palmer, S. (2017). Technology and its role in rehabilitation for people with cognitive-communication disability following a traumatic brain injury (TBI). *Brain Injury*, 31(8), 1028-1043.
  18. Sarasola Sánchez-Serrano, J.L.; Jaén-Martínez, A.; Montenegro-Rueda, M.; and Fernández-Cerero, J. (2020). Impact of the information and communication technologies on students with disabilities. A systematic review 2009-2019. *Sustainability*, 12(20), 8603.
  19. Kim-Rupnow, W.S.; Dowrick, P.W.; and Burke, L.S. (2001). Implications for improving access and outcomes for individuals with disabilities in postsecondary distance education. *American Journal of Distance Education*, 15(1), 25-40.
  20. Olakanmi, O.A.; Akcayir, G.; Ishola, O.M.; and Demmans Epp, C. (2020). Using technology in special education: current practices and trends. *Educational Technology Research and Development*, 68(4), 1711-1738.
  21. Rawool, V.W. (2016). Emerging technologies with potential for objectively evaluating speech recognition skills. *International Journal of Audiology*, 55(sup1), S41-S50.
  22. Chelkowski, L.; Yan, Z.; and Asaro-Saddler, K. (2019). The use of mobile devices with students with disabilities: A literature review. *Preventing School Failure: Alternative Education for Children and Youth*, 63(3), 277-295.
  23. Azizah, N.N.; Maryanti, R.; and Nandiyanto, A.B.D. (2021). How to search and manage references with a specific referencing style using google scholar: From step-by-step processing for users to the practical examples in the referencing education. *Indonesian Journal of Multidisciplinary Research*, 1(2), 267-294.
  24. Al Husaeni, D.F. and Nandiyanto, A.B.D. (2022). Bibliometric using Vosviewer with publish or perish (using google scholar data): From step-by-step processing for users to the practical examples in the analysis of digital learning articles in pre and post covid-19 pandemic. *ASEAN Journal of Science and Engineering*, 2(1), 19-46.
  25. Mulyawati, I.B.; and Ramadhan, D.F. (2021). Bibliometric and visualized analysis of scientific publications on geotechnics fields. *ASEAN Journal of Science and Engineering Education*, 1(1), 37-46.
  26. Al Husaeni, D.N.; and Nandiyanto, A.B.D. (2023). A bibliometric analysis of vocational school keywords using VOSviewer. *ASEAN Journal of Science and Engineering Education*, 3(1), 1-10.

27. Nandiyanto, A.B.D.; Biddinika, M.K.; and Triawan, F. (2020). How bibliographic dataset portrays decreasing number of scientific publication from Indonesia. *Indonesian Journal of Science and Technology*, 5(1), 154-175.
28. Hamidah, I.; Sriyono, S.; and Hudha, M. N. (2020). A bibliometric analysis of covid-19 research using VOSviewer. *Indonesian Journal of Science and Technology*, 5(2), 209-216.
29. Setiyo, M.; Yuvenda, D.; and Samue, O.D. (2021). The concise latest report on the advantages and disadvantages of pure biodiesel (B100) on engine performance: Literature review and bibliometric analysis. *Indonesian Journal of Science and Technology*, 6(3), 469-490.
30. Soegoto, H.; Soegoto, E.S.; Luckyardi, S.; and Rafdhi, A.A. (2022). A bibliometric analysis of management bioenergy research using vosviewer application. *Indonesian Journal of Science and Technology*, 7(1), 89-104.
31. Nandiyanto, A.B.D.; Al Husaeni, D.F, and Ragadhita, R. (2023). Bibliometric data analysis of research on resin-based brake-pads from 2012 to 2021 using VOSviewer mapping analysis computations. *ASEAN Journal for Science and Engineering in Materials*, 2(1), 35-44.
32. Nordin, N.A.H.M. (2022). Correlation between process engineering and special needs from bibliometric analysis perspectives. *ASEAN Journal of Community and Special Needs Education*, 1(1), 9-16.
33. Bilad, M.R. (2022). Bibliometric analysis for understanding the correlation between chemistry and special needs education using VOSviewer indexed by Google. *ASEAN Journal of Community and Special Needs Education*, 1(2), 61-68.
34. Sudarjat, H. (2023). Computing bibliometric analysis with mapping visualization using VOSviewer on “pharmacy” and “special needs” Research data in 2017-2021. *ASEAN Journal of Community and Special Needs Education*, 2(1), 1-8
35. Nandiyanto, A.B.D.; and Al Husaeni, D.F. (2022) Bibliometric analysis of engineering research using vosviewer indexed by google scholar. *Journal of Engineering, Science and Technology*, 17(2), 883-894
36. Nandiyanto, A.B.D.; and Al Husaeni, D.F. (2021). A bibliometric analysis of materials research in Indonesian journal using VOSviewer. *Journal of Engineering Research (Kuwait)*, 9 (Special issue), 1-16.
37. Nandiyanto, A.B.D.; Ragadhita, R.; Fiandini, M.; Al Husaeni, D.F.; Al Husaeni, D.N.; and Fadhillah, F. (2022). Domestic waste (eggshells and banana peels particles) as sustainable and renewable resources for improving resin-based brakepad performance: Bibliometric literature review, techno-economic analysis, dual-sized reinforcing experiments, to comparison. *Communications in Science and Technology*, 7(1), 50-61.
38. Saputra, H.; Albar, C.N.; Soegoto, D.S. (2022). Bibliometric analysis of computational chemistry research and its correlation with Covid-19 pandemic. *Moroccan Journal of Chemistry*, 10(1), 037-049.
39. Hirawan, D.; Oktafiani, D.; Fauzan, T. A.; Luckyardi, S.; and Jamil, N. (2022). Research trends in farming system soil chemical: A bibliometric analysis using VOSviewer. *Moroccan Journal of Chemistry*, 10(3), 576-590.

40. Kurniati, P. S.; Saputra, H.; and Fauzan, T. A. (2022). A bibliometric analysis of chemistry industry research using Vosviewer application with Publish or Perish. *Moroccan Journal of Chemistry*, 10(3), 428-441.
41. Luckyardi, S.; Soegoto, E.S.; Jumansyah, R.; Dewi, N.P.; and Mega, R. U. (2022). A bibliometric analysis of climate smart agriculture research using VOSviewer. *Moroccan Journal of Chemistry*, 10(3), 488-499.
42. Wiendartun, W.; Wulandari, C.; Fauzan, J.N.; Hasanah, L.; Nugroho, H.S.; Pawinanto, R.E.; and Mulyanti, B. (2022). Trends in research related to photonic crystal (PHC) from 2009 to 2019: A bibliometric and knowledge mapping analysis. *Journal of Engineering, Science and Technology*, 17(1), 0343-0360.
43. Nandiyanto, A.B.D.; Ragadhita, R.; Al Husaeni, D.N.; and Nugraha, W.C. (2023). Research trend on the use of mercury in gold mining: Literature review and bibliometric analysis. *Moroccan Journal of Chemistry*, 11(1), 1-19.
44. Gunawan, B.; Ratmono, B.M.; Abdullah, A.G.; Sadida, N.; and Kaprisma, H. (2022). Research mapping in the use of technology for fake news detection: Bibliometric analysis from 2011 to 2021. *Indonesian Journal of Science and Technology*, 7(3), 471-496.
45. Mudzakir, A.; Rizky, K.M.; Munawaroh, H.S.H.; and Puspitasari, D. (2022) Oil palm empty fruit bunch waste pretreatment with benzotriazolium-based ionic liquids for cellulose conversion to glucose: Experiments with computational bibliometric analysis. *Indonesian Journal of Science and Technology*, 7(2), 291-310.