Journal of Engineering Education Transformations ,
Volume 35 , No. 4 , April 2022 , ISSN 2349-2473, eISSN 2394-1707

Emerging Trends and Knowledge Domain in Vocational Education : A Global Perspective

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Abstract : In the recent past, the Vocational Education (VE) has been an emerging concern/area of higher education in India as well as in other nations. Global research has shown that publications in VE are also a key concern and one of the emerging areas of higher education. The purpose of the research study is to evaluate the global research trends in VE based on the bibliometric data collected on 10th February 2021 from the Scopus database from the publication year 1948 to 2021 for 73 years. The findings of the study reveal that 4003 scientific/research articles were extracted related to VE, in which the United Kingdom topped with 1140 publications. Among the most productive (a greater number of articles published) institutions, Universiti Tun Hussein Onn Malaysia was found to be the topper with 168 publications. The Journal of Vocation Education and Training was the top journal that contributed the largest publication with 786 articles.

Keywords : Vocational Education, Higher Education, Bibliometrics, Scopus Database, Educational Research, Scientific Production.

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1. Introduction

The 21st century has witnessed a rise in the field of VE in a global education scenario. VE research is currently a well-established international topic of educational research (Rauner & Maclean, 2008). With varied histories, self-concepts, aims, curriculum, institutions, and practices, VE is often highly regional and nationally focused (Gessler et al., 2021). VE is an integral part of skill development. VE yields higher returns than the same from general education (Agrawal & Agrawal, 2017). Learning in VE (VE) requires strategies that match characteristics, appropriate targets, clear goals, measurable competencies, and indicators. (Nurtanto et al., 2020).

The emergence of research in VE and the trend of researching VE have increased over a while. The country's contribution to the concerned research field is accountable in the publication world. Countries show an extensive difference in their stress on VE (Rodgers & Boyer, 1993). This study aims at evaluating the research trend in VE essentially at the global level as the research is the second dimension of higher education, it is also important to analyse the existing research field of VE in terms of its Productive authors, leading countries, top sources, author collaboration, country collaboration, etc.

2. Rationale Of The Study

There had been no research information about global research trends in VE, and so far, no research has examined at the bibliometric factors in this domain. As a result, this study is an attempt to understand the research trends and knowledge domain in the field of Vocational Education. There is a demand in order to conduct and analyse the global research trends in VE based on bibliographic variables which can bridge the gaps between VE and research in the global scenario. This research paper, comprehends the major emerging research trends and knowledge domain and delivers a global perspective for the present and the future researchers, educators, policymakers and funding agencies in the VE domain.

3. Objectives Of The Study

To evaluate the selected bibliometric variables in VE Publications from the Scopus database like the global annual scientific production, the most productive authors, author collaboration, institutions, sources, country collaboration, and creating a word cloud for the authors' keywords, all keyword collaborative clusters. All the results of the objectives were presented in tables and figures.

4. Literature Review

VE and its skill development among youth are important for the global economy. In developing nations, skill development is increasingly seen as a method to break free from the cycle of low education and high unemployment (Jain et al., 2019). Young people's VE can help them overcome the difficulty of finding work (Shepherd, 2019). VE is primarily concerned with 'applied learning,' or the acquisition of information, skills, attitudes, and ethics suited for the workplace to enhance possibilities for productive employment, sustainable livelihoods, personal empowerment, and socioeconomic growth (Sithole, 1998).

The establishment of skills qualification frameworks, such as the National VE Qualifications Framework (NVEQF) recently established in India, is being pursued by all nations in South Asia. VE is becoming a key component of national human resource development strategies in Gulf Cooperation Countries (Mellahi, 2000). In many countries around the world, VE has been the subject of reform (Chappell, 2003). From the second part of the twentieth century forward, VE became increasingly essential in meeting the needs of mass higher education (Moodie, 2008). Beyond Europe, policymakers in other developed nations ensure that VE and training meet both the demand for a flexible workforce and the need to equip workers with a broad range of skills and knowledge (Balatti & Black, 2011). India's population is growing, resulting in over a million untrained and undereducated people, as well as a talent shortage. They could benefit from VE and training (Keep, 2012). In Europe, VE has resisted standardizing to a greater extent than other disciplines of study. International, comparative VE research has grown in popularity during the last decade (Christian H. Jorgensen, Ole J. Olsen, 2018).

Higher education is more theoretical than VE, which is more practical and has a greater vocational focus. Because of the increasingly global economy and fierce competition, the higher education sector is a key sector, owing to the growing demand for educated workers who are employed internationally (Vrat, 2012). VE is seen as a critical component in enhancing or sustaining the company and national economic competitiveness. VE reduces unemployment by equipping persons with employable skills. It enhances the students to meet their economic demand in the employment market. VE enables the students to find jobs with skill development. There is a strong association between systematic VE and the successful economy of a country (Cantor, 1991). The scarcity of suitable skills is one of the major reasons contributing to the growth in unemployment. This is known as the 'skills-deficit model' of unemployment (Wellington, 1986). Teacher skills in VE are built on a continuous process of growth to perceive those competencies holistically (Ana et al., 2020).

Most emerging countries have high rates of young unemployment. Secondary school vocational skills training has been regarded as one of the primary methods of equipping young people with the essential abilities, with the underlying premise being that a lack of skills is the most significant impediment to employment (Okwuanaso, 1985). A variety of programmes are being implemented around the country to boost the VE and employment possibilities of women and girls (Terms, 1985). The major way of offering more effective VE for both adolescents and adults is competency-based VE (Watson, 1991). As seen by initiatives in India, Sri Lanka, the Philippines,

Zimbabwe, Nigeria, Kenya, and Ghana, VE has continued to be pursued in the many educational reforms tried by emerging nations (Abrokwa, 1995). The use of modern technology in the learning process, particularly in VE, can draw attention and possibly speed up learning (Nurtanto et al., 2020). In cooperation with the Ministers of Education (MHRD) and Labour, the Government of India introduced the VE Scheme in its early five-year development plans (J.P.Gupta, 1996).

Interdisciplinary educational research focuses on VE. Scholars in allied fields are likewise interested in the international collaboration that is linked with VE (Li & Pilz, 2021). VE research is a distinct educational field that is linked to the mouldings of the transition from schooling to employment. The emergence and origins of didactic techniques and conceptions of vocational teaching and learning, as well as their research context (Zhao, Zhiqun, 2014). Scientometrics has grown in popularity as both a subject of study and a set of methodologies (Sooryamoorthy, 2020).

The productivity of scientific products is evaluated quantitatively using bibliometric approaches (Dervis, 2019). The frequency with which two previous texts are mentioned by a subsequent text is known as co-citation (Liu & Hu, 2021). When two articles are referenced in the same third article, this is known as co-citation. Co-citation is therefore the antithesis of bibliographic coupling. The citations made by the later or more recently published publications are crucial to this study. Knowledge Mapping is a method of combining knowledge from research and publication in any domain/subject (Thamizhiniyan et al., 2020). Undertaking study in any topic fundamentally requires a researcher to grasp the past, comprehend the present, and forecast the future. Studying the emerging trends and knowledge domain in a subject essentially needs bibliometric techniques.

5. Methodology

During February 2021, the screening approach reviewed all references related to "Vocational Education" in the specified search field 'Title-Abstract-Keyword' of Scopus database, and 4003 scientific publications contributions were retrieved. As a result, the findings cover a period of 73 years, spanning 1948 to 2021. The data analysis focused on 42 journals that already published articles related to VE as the central subject and include the keywords Education (al), Vocation (al), or Learning as one of the words in the title of the journal.

A. Analysis Of Data

Retrieved data were analysed by using three various Bibliometric Analysis and Visualization Tools:

1) Bibliometrix- An R Statistical tool used to analyse and establish Global Annual Scientific Production, Top Authors Production over the time, Most Productive Institutions/Affiliations and Sources/Journals, Word Cloud for the Authors Top Keywords, Three Plot Association, Frequency of Keywords, Country Scientific Production and Country Collaboration Map (Aria & Cuccurullo, 2017).

2) ScientoPy- version 2.0.3, is a Python script that used to generate Most Productive Countries(Ruiz-Rosero et al., 2017)

3) VOSviewer – a software tool used to construct and visualize the Cluster networks for the association of top Authors, Authors' Keywords and Countries Collaboration (Eck & Waltman, 2019).

B. Delimitations Of The Study

The study used the data only from the Scopus database and the data retrieval was done on 10th February 2021.This study focused only on the article published in the English language. The limitation of this study was that it only examined research articles published in journals that published more than 20 articles with VE as a central subject and included any of the words Education/(al) or Vocation/(al), or Learning in the title of the journal. Other types of publication documents, such as conference papers, books, book reviews, and editorials, were excluded from the analysis.

Table 1 depicts the evolution of VE research trends from 1948 to 2021. The number of Journal article papers provided in VE research is 4003. For the whole 73-year period, the compound annual growth rate of AE research production is 5.95 percentage. The VE research works are dispersed over 42 journal sources, including 4726 multi-authored papers and 1136 single-authored documents. The average number of citations per document is 10.78. This table provides a

Table 1 : Detailed Summary of VE Publications

DESCRIPTION	RESULT
Timespan	1948:2021
Sources (Journals)	42
Documents	4003
Average citations per document	10.78
Average citations per year per doc	1.015
DOCUMENT TYPES	
Article	4003
DOCUMENT CONTENTS	
Keywords Plus (ID)	482
Author's Keywords (DE)	6356
AUTHORS	
Authors	5862
Author Appearances	8588
Authors of single -authored documents	1136
Authors of multi-authored documents	4726
AUTHORS COLLABORATION	
Single-authored documents	1636
Documents per Author	0.683
Authors per Document	1.46
Co-Authors per Documents	2.15

detailed summary of the datasets provided in connection to VE scientific production.

Figure 1 illustrates the number of VE publications over 73 years, commencing in 1948 with one and finishing in 2020 with 282. The number of VE publications has continuously grown from 1984 to 2020. Furthermore, there was a significant increase in publications in 2020, with 282 being the most. The current year has 34 publications as of 10th Februaryv2021.

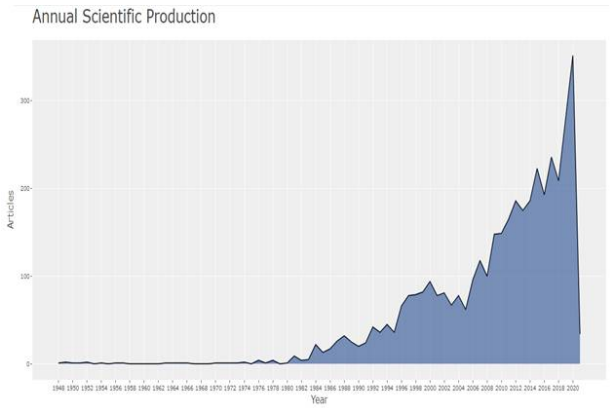

Fig. 1: Global Annual Scientific Production in the field of VE

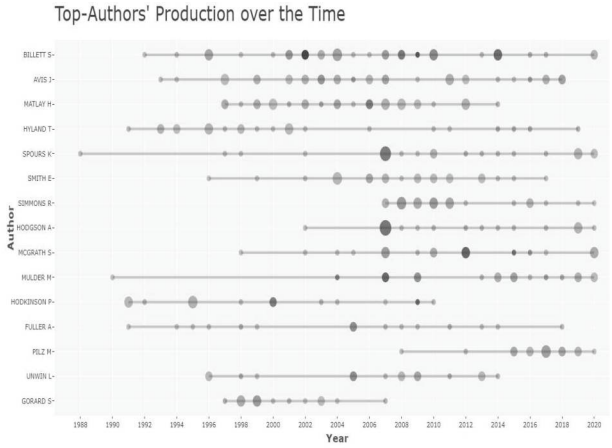

Fig. 2: Top Authors' Production over the years

Figure 2 illustrates the top author's performance over 32 years. Among the top 20 authors in the field of AE publishing, Billett S placed first with 35 publications, followed by Avis J with 33 publications and Matlay H with 30 publications. The five authors that generated 20 to 24 publications are Hyland T and Spours K-24, Smith E-23, Simmons R-22, and Hodgson A-20. The other twelve authors have 12 to 14 publications. Spours K used to publish from 1988 until 2020. Figure 2 shows that the year 2007 was the most prolific, with the most publications.

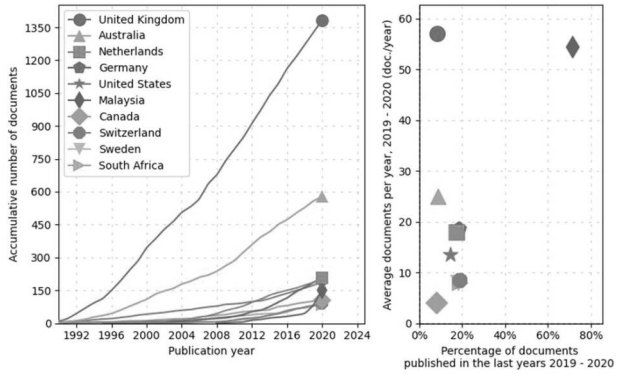

Fig. 3: Most Productive Countries in VE Publication

Figure 3 represents the most productive nations up to 2020. The United Kingdom led the publication list with (1348), followed by Australia (577), the Netherlands (209) Germany (200), the United States (187), Malaysia (153), Canada (103), Switzerland (91), Sweden (88) and South Africa (85). Between the

years 2020 and 2021, there was a rise in nation publishing, particularly in Malaysia, which was followed by the United Kingdom.

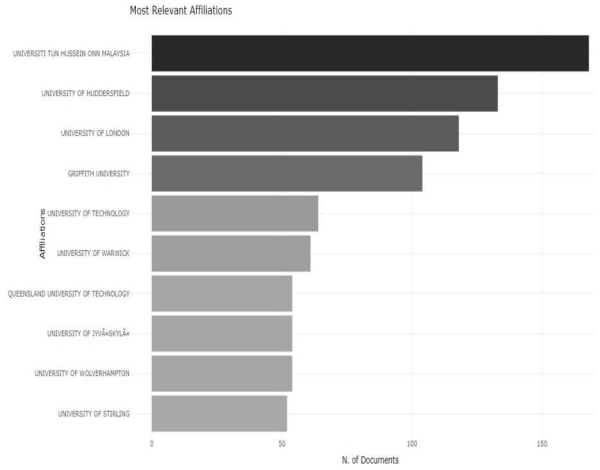

Fig. 4: Most Productive Institutions in VE Publication

Figure 4 depicts the top prolific institutions in VE Publication. The top institutions with more than 100 publications were represented by the dark blue colour. Among the top ten institutions, Universiti Tun Hussein Onn Malaysia was found to have the most publications (168), followed by the University of Huddersfield with 133, the University of London with 118, Griffith University with 104, the University of Technology with 64, the University of Warwick with 61, the University of Wolverhampton, University of Jyvaskyla, and Queensland University of Technology each had 54 publications, while the University of Stirling had 52.

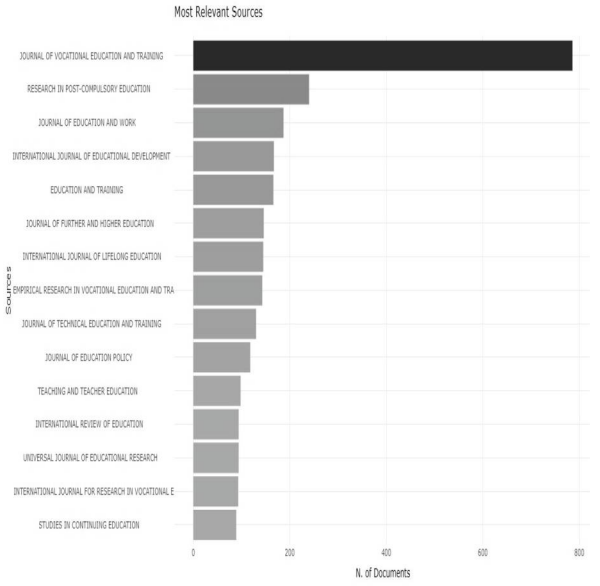

Fig. 5: Most Productive Sources in VE Publication

Figure 5 describes the data about the most productive sources of VE publishing. The graph indicated the top twenty journal sources that were significant in VE articles. The results revealed that the topmost journal, Journal of Vocation Education and Training, contributed the most publications with 786 articles, followed by 240 articles in Research in Post Compulsory Education, 187 articles in Journal of Education and Work, 167 articles in International Journal of Educational Development, and 166 articles in Education and Training, followed by other listed journals (Secinaro et al., 2020).

Fig. 6: Word Cloud of Authors Keywords in VE publication

Figure 6 depicts the construction of a word cloud for the keywords used by the authors in their publications. The word cloud was created with the help of Bibliometrics. The authors' major keyword was VE, which was followed by comparable phrases that were closely linked with VE, such as Higher Education, Further Education, Workplace Learning, Vocational Training, Employability, Lifelong Learning, Professional Development, and so on. This figure highlighted the primary regions of having linked keywords of VE.

The frequency of keyword appearance (all Keywords) in VE research publications was shown to be related to the frequency of bibliometric data analysis. The term VE and Training was used as a keyword 226 times, accounting for 12% of the total publishing situation. Other closely related key terms to VE identified were VE 199 times with 10%, Higher Education 189 times with around 10%, Further Education 122 times with 6%, Workplace Learning 95 times with 5%, VET 94 times with 5%, Employability 74 times with 4%, and Vocational Training 72 times with 4%.

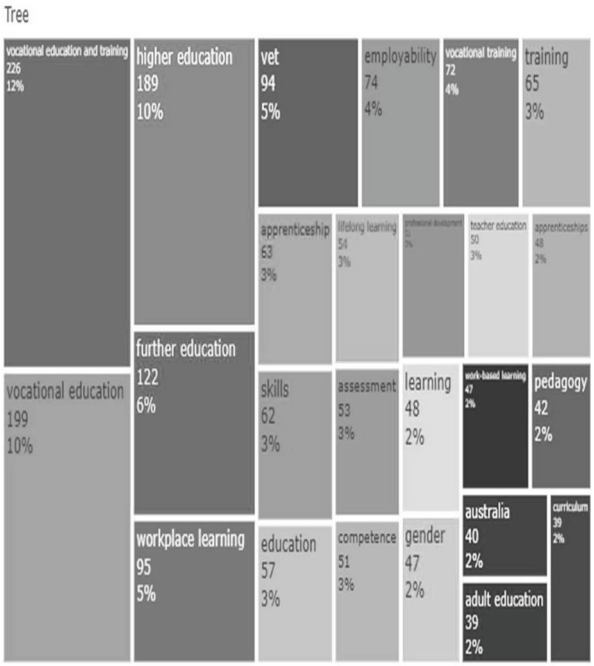

Fig. 7: Frequency of Keyword Occurrence in VE Research – Keyword Tree of VE

The important elements in this three-field plot were represented by rectangles in different colours for easy reference. The names of the nations, authors, and sources are represented by the height of the rectangle. The more relationships there were, the higher the rectangle representing the function was.

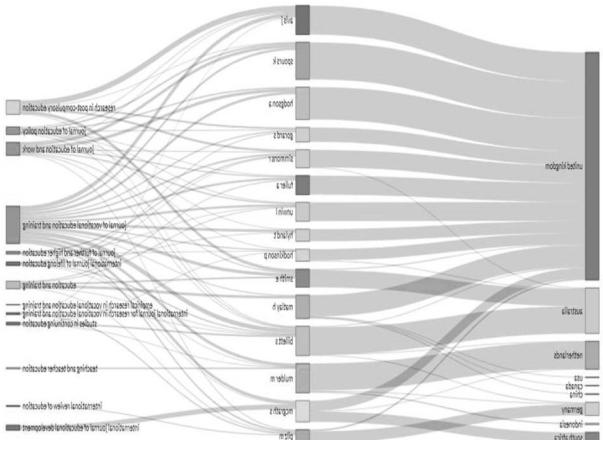

Fig. 8: Three-Fields Plot Association among top Countries (left), Authors (middle) with Sources (right)

Figure 8 depicts the connection between the three components. According to the research, the top countries, authors, and sources were (the United Kingdom, Australia, and the Netherlands), and seven authors (Spours K, Hodgson A, Avis J, Mulder M, Billett S, Matlay H, and Mcgrath S) had a strong association with the three sources; the journal of Education and Work, Research in Post Compulsory Education, and Journal of VE and Training. (Janik and Ryszko, 2020).

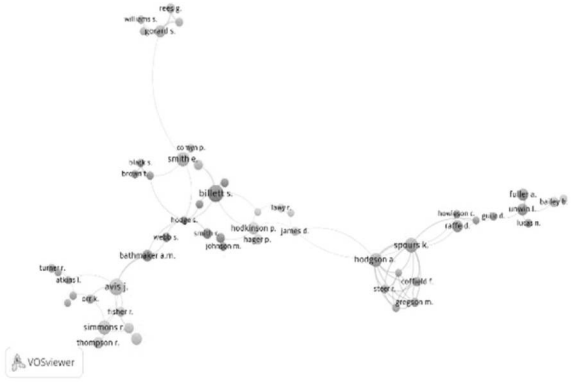

Fig. 9: Authors Name Collaborative Cluster in VE Research

The co-authorship analysis cluster of the top fifty-four authors in VE articles is depicted in Figure 9. The network visualisation produced ten total co-authorship clusters, 54 authors with 88 authorship linkages, and 258 total link strengths. The key author collaboration cluster of Billett S, Avis J, and Spours K were the most significant among them.

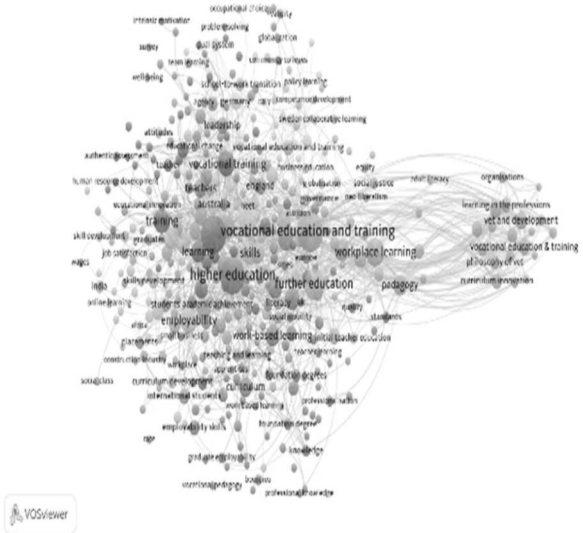

Fig. 10: All Keywords Collaborative Cluster in VE Research

The Co-occurrence analysis of all terms from VE articles is shown in Figure 10. The study depicts the collaborative cluster, and the network visualisation output discovered 454 total keys, 11 clusters with 6132 keyword linkages, and 9871 overall link strength. The primary cluster core terms were VE and training, higher education and further education, and so on.

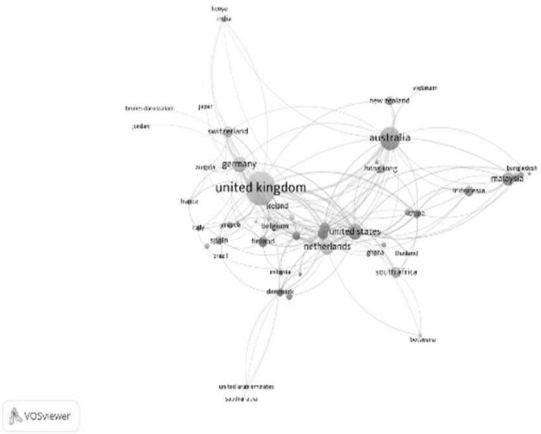

Fig. 11: Country Collaborative Cluster in VE Research

Figure 11 depicts a country-by-country examination of all VE articles' co-authorship. The research discovered the collaborative cluster, and the network visualisation output revealed 53 nations forming 11 clusters with 193 collaborative linkages and a total link strength of 486. The United Kingdom, Australia, Malaysia, and the Netherlands have the strongest country collaborative clusters.

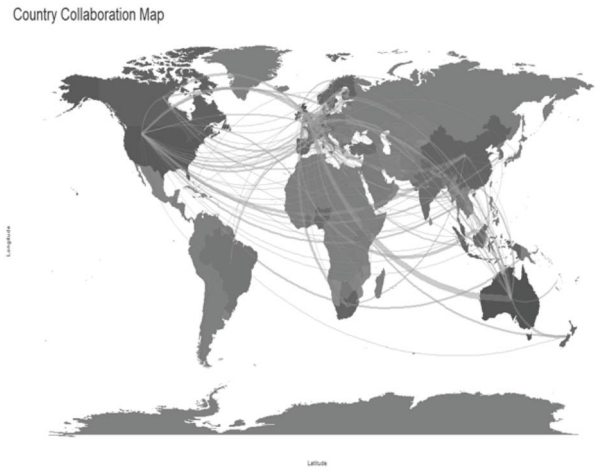

Fig. 12: Country Scientific Collaboration Map in VE Publication

Figure 12 depicts the results of a social structure study performed for the creation of a Country Scientific Collaboration Map in the VE publication. According to the map, the United Kingdom, the United States, the Netherlands, Australia, Canada, and Finland had the world's top five collaborative research publication networks, putting them at the forefront of exceptionally rapid development. In the field of VE, the collaboration between the United Kingdom and Australia produced 28 publications, followed by a collaboration between the Netherlands and Belgium with 23 publications, Indonesia and Malaysia with 15 publications, Switzerland and Germany with 13 publications, and collaboration between the United Kingdom and China with 10 publications (Biancone et al., 2020).

6. Major Findings

The goal of this paper is to conduct a quantitative, and systematic overview of VE research with bibliometric analysis of all VE-related articles from the Scopus database. The authors of this bibliometric analysis revealed the overall VE research as viewed through the lenses of the top 42 journals listed in Scopus, during the last seven decades.

The result reports a 5.95 percentage compound annual growth rate for AE research output, with an average citation per document of 10.78. The findings indicated that multi-authored documents had a three-fold advantage over single-authored papers. The findings also indicated that in terms of publications, 2007 was the most productive year.

Between 1948 and 2020, the number of VE articles publications has risen 282-fold. It shows that there is an increasing trend in VE research and publication. Between January 1st and February 10th, 2021, the authors deducted a significant rise in the number of publications in a month, with 34. It also demonstrates how fast VE research advances in publication.

The results reveal that 20 authors consistently performed well throughout 32 years in terms of author output. Billett S was ranked top (35), followed by Avis J (33) and Matlay H (30) as the most productive three authors with more than 30 articles. Spours K was one of the top twenty prolific authors in the world who continuously published articles from 1988 to 2020. The article titled "Toward a Workplace Pedagogy: Guidance, Participation, and Engagement" (2002), authored by Billett S, an Australian educational researcher and Professor of Adult Vocational Education in the School of Education and Professional Studies at Griffith University, and published in the Journal Adult Education Quarterly (SAGE Publications), received the most citations (201 total).

Globally 91 countries contributed to VE publications. European countries domination found more in productivity. The United Kingdom was found as the most prolific country in VE research, with an h-

index of 56, followed by Australia with an h-index of 38, the Netherlands with an h-index of 32, Germany with an h-index of 20, and the United States with an h-index of 22. Citation analysis findings found the nations with the highest number of citations. The United Kingdom, like the most productive country, led in overall citations with 14490, followed by Australia (5818), the Netherlands (2814), the United States (1743), Germany (1452), and Finland (942).

The findings revealed that the first five journals in the top ten productive sources (journals), namely Journal of Vocational Education and Training, Research in Post-Compulsory Education, Journal of Education and Work, International Journal of Educational Development, Education and Training, were all published in the United Kingdom, with Taylor & Francis being the leading publisher among the publishers.

Worldwide, 1864 institutions contributed to VE publications. Four of the top institutions were from the United Kingdom and four were from Australia. Finland and Scotland both had each institution. The cluster and link among the authors in a given subject may be identified using co-author analysis. The findings revealed a total of 88 authorship relationships with ten co-author clusters in this study.

Finding country-by-country Co-authorship revealed that 53 nations were grouped into 11 clusters, each with 193 collaborative linkages. It demonstrates the importance of country collaboration in attaining Multi-Country Publication (MCP). The results also revealed that the United Kingdom, Australia, Malaysia, and the Netherlands have significant country collaborative clusters. Social Structure analysis revealed the scientific collaboration among countries and found that The United Kingdom, the USA, the Netherlands, Australia, Canada, and Finland were the top five collaborative country's scientific publication networks in the world.

India was rated 25th out of 91 nations, with 37 publications. There were 25 single-country articles and 12 multi-country publications among the findings. With an h-index of 8, India earned 141 total citations and 11.7 average article citations. Collaboration between countries identifies India has 12 articles with six-nation collaborations: Germany (four), the United Kingdom (three), Australia (two), Kenya (one), Switzerland (one), and the United States of America (one). The period between 1984 and 2020 exhibited considerable development in the publishing, it is considered that VE has been a rising issue in the world of literature. Furthermore, in 2020, there was a significant increase in publications, with 282 publications being the most.

7. Recommendation And Conclusion

In any country's higher education system, research is the lifeblood of advancement. In India, research is regarded as the second most important aspect of higher education after teaching.VE encompasses Formal, Non-formal, and Informal education and is one of the most multidisciplinary and continually potential areas. Since the research literature in this area of VE is exploding, funding agencies and academic institutions should take necessary measures to trigger scholars' interest in VE research. In terms of publication production growth, author share, institutional, international collaboration, and citation quality in VE research, India lags considerably behind other nations. Developed nations are the leading producers of scholarly papers in VE, and India has to catch up through collaborating with leading authors and countries. Financing is a crucial component in every institution's research growth, and Indian institutions and scholars require adequate funding from national and international agencies to publish a large number of research papers in journals that are listed in international databases like Scopus. To boost production and improve research quality, there should be a significant rise in international collaboration through universities and institutions of National importance by means of Memorandum of Understanding (MoU). In recent past research publications related to VE, international journals are the most productive sources of publications, however, India needs to address this research deficit significantly realising the research facilities.

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