Exploring yearly vocational graduate career development, article citation and top publications

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ARTICLE INFO

ABSTRACT

There has been a lot of research on career development, including during the COVID-19 period, but the number of studies that specifically analyze related developments from year to year is increasingly limited. This study aims to determine the development of research that focuses on career development of vocational graduates by using the bibliometric analysis method. The analysis was conducted by collecting articles published in Scopus indexed journals. Publication data collection was carried out using Scopus journals. VOSviewer application to create bibliometric network visualization. The results of the analysis show that the United States is a country that contributes the largest number of publications that discuss career development in the world. *Center for International Research on Education Systems, Victoria University, Melbourne, Australia* is the first institution to publish about career development among the top 10 institutions.

1. Introduction

Vocational education is considered capable of overcoming unemployment IIndonesia. This type of education emphasizes more on the skills and technical knowledge aspects of students. Unfortunately, vocational education is one of the biggest contributors to unemployment in Indonesia. According to the Central Bureau of Statistics (BPS, 2022), the Open Unemployment Rate (TPT) in Indonesia for SMK graduates reached 1,876,661 people (7.35%). Career development is an effort to reduce the mismatch between graduates and employment so as to overcome the problem of unemployment (Okolie et al., 2020). Career development is a step to manage resources to achieve a goal (Fustyna & Jumani, 2015). The large number of unemployment is caused by one factor, namely the lack of career development provision for vocational graduates (Li & Liu, 2022). With a good career development provision, it is hoped that vocational education can achieve the goal of reducing unemployment. (Rojaki & Martha, 2021). Career development is a widely discussed topic, but in recent years, including during the Covid-19 pandemic, research on career development has begun to decrease (Vermunt et al., 2019). This study aims to determine: (1) the development of the number of international publications on the topic of career development of vocational graduates from 2018-2023: (2) the number of citations from core journals on the topic of career development of vocational graduates (3) the most publications by country and organization on the topic of career development of vocational graduates (Iis, et al., 2022).

2. Method

This research is categorized into literature review research, which analyzes various literatures used in research to be studied and identified and then drawn conclusions (Sari *et al.,* 2022). This research uses bibliometric and mathematical visualization methods to evaluate the literature on a particular topic. Using bibliometric techniques, identify research fields, countries/regions, journals, and authors with outstanding performance, as well as project future research trends in a particular topic (Xu *et al.,* 2021). As a quantitative method, bibliometric analysis uses evaluative as well as descriptive approaches to represent research trends and characteristics of a set of publications (Eck & Waltman, 2017). Bibliometric visualization methods are used to show a structural overview of a particular research area. Before the search and data collection process is carried out, (PHASE 1) keywords related to the corresponding topic must be correct and definite. (PHASE 2) Documents were exported to VOSviewer software for bibliometric analysis of publications, authors, countries, institutions, journals, and areas (data visualization phase); and (PHASE 3) data analysis to identify research developments focusing on career development of vocational school graduates, as shown in Figure 1.
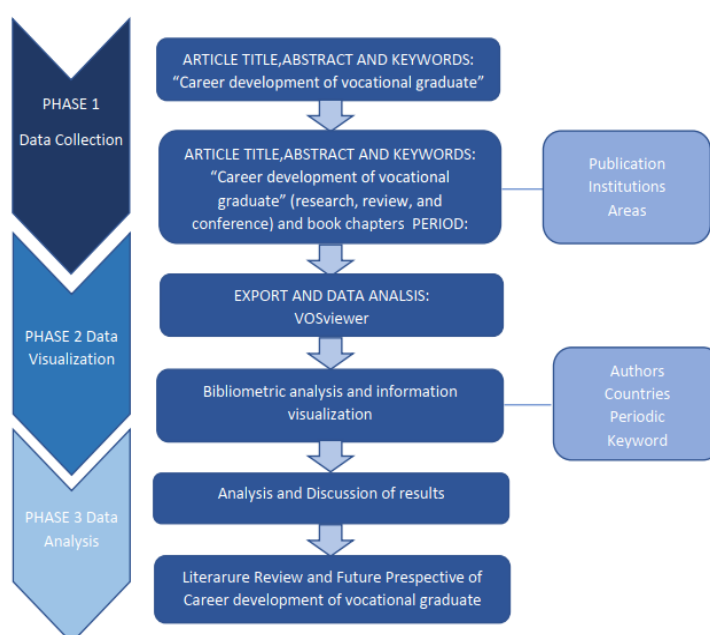
Figure 1. Flow Chart of Research Methods

The search was conducted on June 13, 2023 using the keywords "career development*" AND "student" OR "graduate" AND "vocational high school*" OR "vocational*" OR "engineer*" OR "technical education*" OR "technical education*" OR "tvet" OR "veterinarian" OR "career technical education (CTE)" as input. The data analysis technique used was deductive by starting from general findings to more specific findings.

3. Results and Discussion

3.1. Yearly Development of Publications

As mentioned, a search of the VOSviewer database found that during 2018-2023 there were 354 journal articles published with an average publication rate of 70.8 per year.
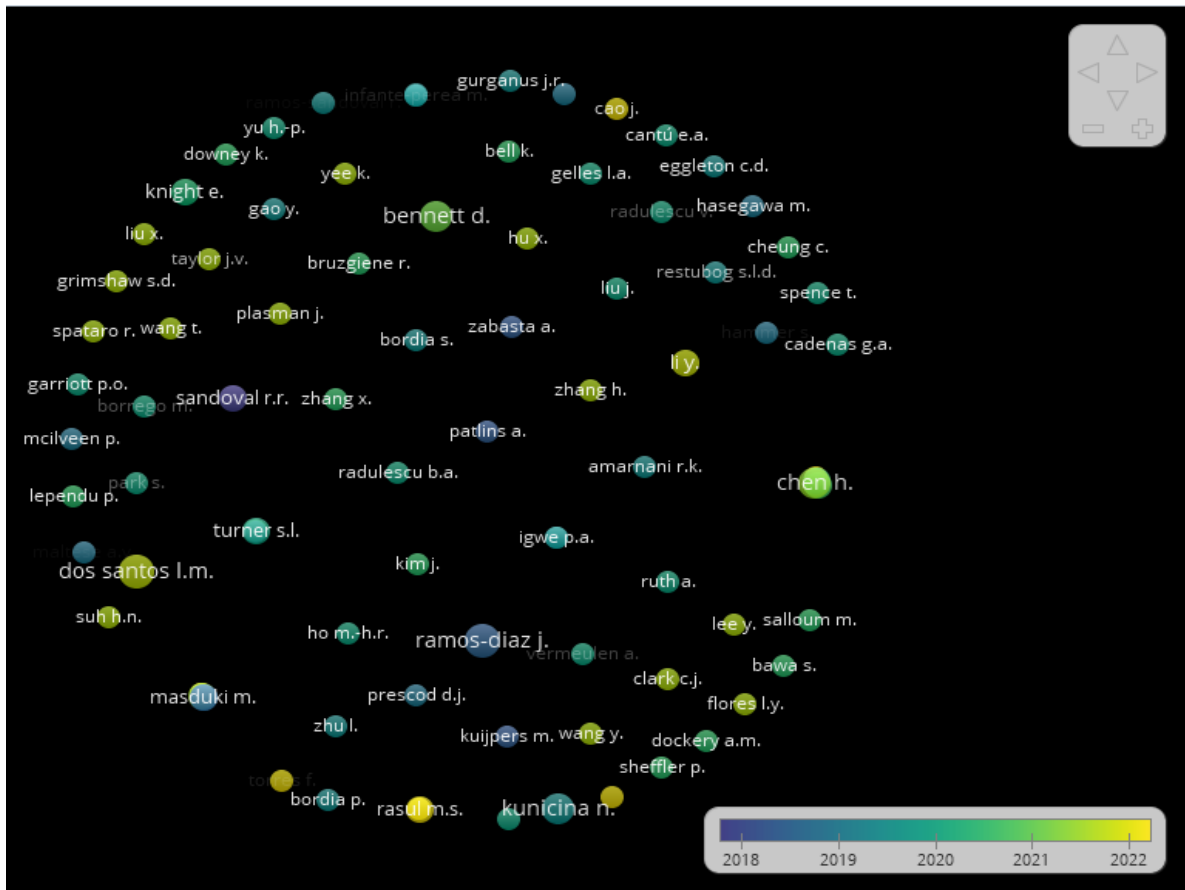
Figure 2. Mapping Publication of articles every year

The results of the analysis show that from 2018-2019 there was a fairly rapid growth in the number of publications related to career development, from 2020-2021 there was a decrease in publications. And there was another decline for publications related to career development in 2021-2022. Career development writing continues to grow over time.

3.2. Publication with Article Citation

The number of citations reached 1000 for the period 2018-2023. Table 1 shows the 20 most cited articles.

Table 1. Publications with the Highest Number of Citations.

No	Author/ Year	Title	Citation
1.	Kuo h (2018)	Promoting college student's learning motivation and creativity through a stem interdisciplinary pbl human-computer interaction system design and development	78
2.	Hayter c.s (2019)	Factors that influence the transition of university postdocs to non-academic scientific careers: an exploratory study Source research policy	49
3.	Ranger b.j (2018)	Design thinking in development engineering education: a case study on creating prosthetic and assistive technologies for the developing world	46
4.	Lee I (2021)	Developing middle school students al literacy	44

No	Author/ Year	Title	Citation
5.	Hui k (2018)	The roles of family, culture, and social cognitive variables in the career interests and goals of asian american college students	42
6.	Wehmeyer m.i(2019)	Crisis in career development life designing and implications for transition	40
7.	limeri l (2019)	"Where's my mentor?!" characterizing negative mentoring experiences in undergraduate life science research	32
8.	Dos santos lim(2019)	Developing bilingualism in nursing students: learning foreign languages beyond the nursing curriculum	25
9.	Warner.t (2019)	The relationship between advanced placement mathematics courses and students' stem career interest	23
10.	Cadenas g.a (2020)	A programmatic intervention to promote entrepreneurial self-efficacy, critical behavior, and technology readiness among underrepresented college students	23
11.	Okolie uc (2019)	Improving graduate outcomes for technical colleges in Nigeria	20
12.	Al maini (2020)	The world forum on theumatic and musculoskeletal diseases (wfrmd)	20
13.	Wen y (2020)	The relationship between emotional intelligence and entrepreneurial self-efficacy of chinese vocational college students	19
14.	Ogbuanya tc (2018)	Effect of rational emotive behavior therapy on negative career thoughts of students in technical colleges in nigeria	19
15.	Seifan m (2020)	The effect of real and virtual construction field trips on students' perception and career aspiration	18
16.	Cachero (2020)	Impact of programming exposure on the development of computational thinking capabilities: an empirical study	16
17.	Kreider cm (2018)	A model for simultaneously advancing campus-based supports for learning disabilities, stem students' skills for self-regulation, and mentors	12
18.	Cartigny e (2021)	Typologies of dual career in sport: a cluster analysis of identity and self-efficacy	12
19.	Bennett d (2020)	Graduate employability and the career thinking of university stemm students	9
20.	Kantemnening (2018)	Contextual factors in the career development of prospective first-generation college students: an application of social cognitive career theory	8

Table 1. shows that the topic of career development is related to various other topics. Based on table 1, it can be understood that one of the topics related to career development is self efficacy and skill development. This shows that there are several keywords that can be used as a reference for new research.

Table 2. Number of publications per year

Publication Year	Number of Publication
2018	43.0
2019	58.0
2020	80.0
2021	69.0
2022	81.0
2023	23.0
Total	354.0
Rata-Rata	59.0
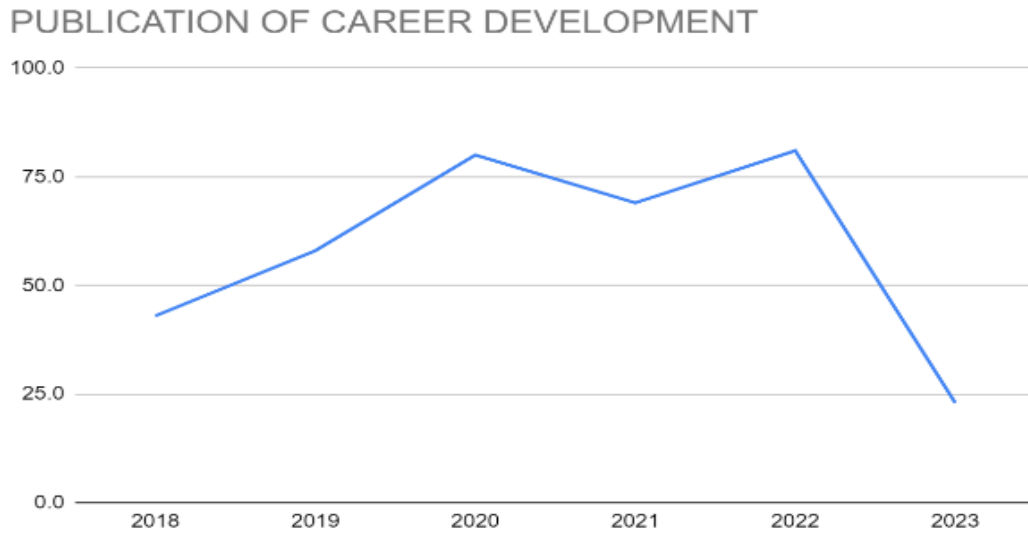
Figure 3: Publication progression chart

Table 2. and Figure 3. show that publications between 2018-2019 amounted to 43 publications. In 2019-2020 the number of publications increased by 30 publications, the number of publications in 2021 experienced a significant decrease of 11 publications. The year 2022 again experienced a significant increase, but in 2023 experienced a significant decrease as well. It should be noted that the number of publications in 2023 can still increase considering that this research was conducted in July 2023, so it is still possible to add publications until the end of 2023.

In general, it can be concluded that the number of publications focusing on career development is not always a topic that is continuously discussed and associated with other topics. Seeing the increase and decrease in the number of publications is erratic every year. However, the increasing trend in 2022 is expected to be the beginning of more research beingconducted related to career development of vocational graduates. Tabel 1. Hasil belajar siswa kelas eksperimen dan kelas control.

3.3. Top Publications by Country and Organization

In the past 6 years, 44 countries have published articles on career development as shown in Figure 2. Among these countries, the United States has published the most articles in the past 5 years, with a total of 126 documents (35.59%), followed by China with 35documents (9.88%), and Australia with 27 documents (7.62%).
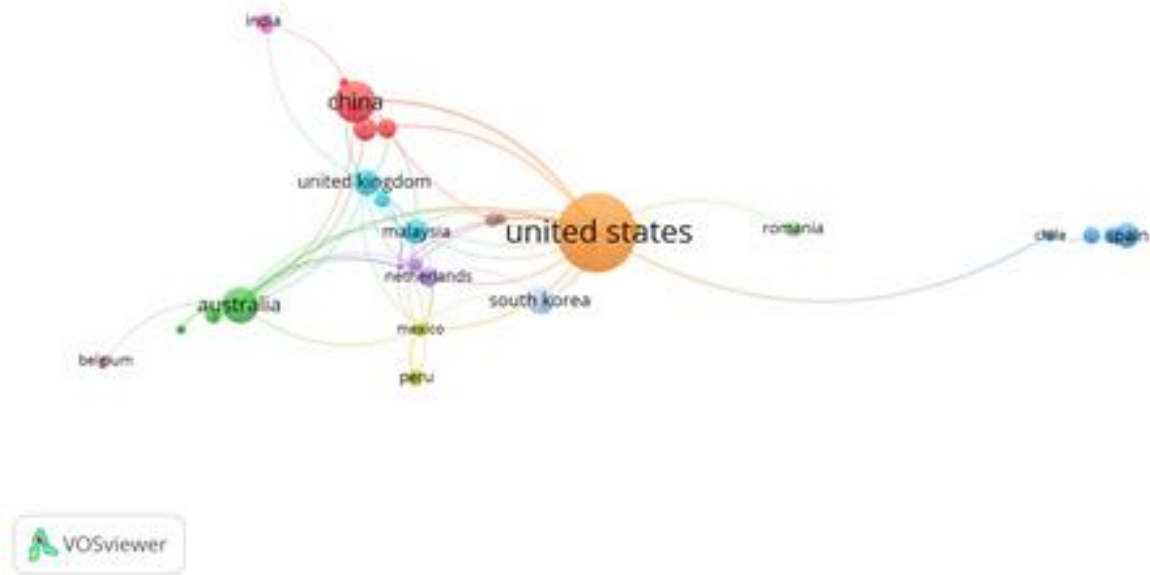
Figure 4. Countries with the Most Articles Published on Career Development.

In terms of research centers that contributed to the publication of articles on career development, this study identified 768 institutions that participated in the publication. As listed in table 3, the *Centre For International Research On Education Systems, Victoria University, Melbourne, Australia* was the first organization to publish articles on career development with 4 documents (1.13%). Like the results of the most countries discussed earlier on the most countries in article publication, among the top 10 institutions, three of them are in the United States, namely *Center For Research And Reform In Education* with 3 documents (0.85%), Boston College with 2 documents (0.56%), and *Department Of Counseling And Psychological Services* with 2 documents (0.56%). Thus, the total percentage of article publications in the United States from the top 10 institutions is 1.97%, the highest compared to other countries. The data corroborates the results presented in Figure 4.

Table 3. Organizations with the Most Articles Published on Career Development

No	Organization	Document
1	Pusat Penelitian Internasional Sistem Pendidikan, Universitas Victoria, Melbourne, Australia	4
2	Pusat Penelitian dan Reformasi Pendidikan, Universitas Johns Hopkins, Baltimore, Ma 21286, Amerika Serikat	3
3	Fakultas Pendidikan, Universitas Normal Beijing, Beijing, Cina	3
4	Sekolah Ilmu Pendidikan, Nanjing Normal Universitas, Nanjing, Cina	3
5	Bankwest Curtin Economics Centre, Curtin Universitas, Perth, Australia	2
6	Boston College, Chestnut Hill, Ma, United States	2
7	Pusat Studi Ilmu Pengetahuan dan Masyarakat Interdisipliner, ,Ciics Universidad De Ciencias Y Humanidades, Lima, Peru	2
8	Institut Sains dan Teknologi Chitose, 758-65 Bibi, Chitose, Hokkaido 066-8655, Jepang	2
9	Departemen Layanan Konseling dan Psikologis,Universitas Negeri Georgia, Amerika Serikat	2
10	Departemen Psikologi, Shanghai Normal University, Shanghai, Tiongkok	2

Keyword analysis is required to identify which words appear more frequently in publications (Zhan *et al.,* 2022). In this study, the results of keyword co-occurrence analysis identified the words that appear frequently in publications on career development and what terms are related. Based on the results of this research on career development, at least 2154 keywords were found on the theme which were then eliminated using a threshold of 2 and resulted in 431 keywords (20%) which were divided into 15 clusters as shown in Figure 5.

Figure 5. Network Visualization of Keywords Based on Total Link Strength

The most use keywords from each cluster are:

- Cluster 1 (65 items): career development (138), employment (113), students (106), technical education (74), professional aspects (59).
- Cluster 2 (57 items): human (39), human (30), article (26), career (25), human experiment (20).
- Cluster 3 (44 items): students (26), decision-making (21), techniques (13), vocational identity (11), career exploration (9).
- Cluster 4 (42 items): educational computing (18), motivation (14), STEM (science, technology, engineering, and math) (14), motivation (14), self-efficacy (11)
- Cluster 5 (39 items): employability (14), STEM (13), career adaptability (10), students (7), innovation (6), educational institutions (5)
- Cluster 6 (33 items): higher education (20), social cognitive career theory (15), career planning (9), vocational colleges (5), postgraduate education (3)
- Cluster 7 (29 items): career (4), work experience (3), skills (3), postgraduate (3), knowledge (3)
- Cluster 8 (26 items): education (30), vocational education (17), controlled studies (10), technology (5), employment (3)
- Cluster 9 (21 items): curriculum (11), professional development (10), entrepreneurship (6),student perception (5), secondary school (5)
- Cluster 10 (21 items): life vocation (11), college student (8), self-concept (8), young adult (7), teenager (6)
- Cluster 11 (16 items): teaching (18), learning (9), internships (6), communication skills (6), e-learning (5)
- Cluster 12 (15 items): labor market (5), soft skills (5), trade (5), technical universities (3), competition (2)
- Cluster 13 (13 items): industrial research (4), machine design (3), undergraduate research (3), best practices (2), synergetics (2)
- Cluster 13 (13 items): industrial research (4), machine design (3), undergraduate research (3), best practices (2), synergetics (2)
- Cluster 15 (1 item): personalized learning (2)

In addition to knowing the various keywords and their clusters, the analysis results using VOSviewer can also provide knowledge about the use of these keywords in article publications no 9 in a certain time span shown in figure 6.

Figure 6. Overlay Visualization of Keywords Based on Total Link Strength

Identification searches through VOSviewer to find out the development of the number of article publications each year are carried out through *Citation-Author* (Maier *et al.,* 2020). To find out the most countries that contribute to discussing career development, namely through *CoAuthorship Country. Co-Authorship-Organization* to find out the organization that does the most publications related to career development and *CoAuthorship-All keywords* to find out the appropriate keywords (Sharma & Dhanoa, 2022).

The results of identifying existing publications, especially the 20 publications with the highest citations, and the results of keyword cooccurrence analysis show that the topic of career development is decreasing every day, so the topic of career development is not a topic that is always discussed every year (Haug & Mork, 2021). Career development is closely related to several topics, such as vocational graduate, self-efficacy and skill development, this can be seen from the development of international article publications, as well as keywords obtained from the results of analysis using the VOSviewer application.

4. Conclusion

The trend of writing articles in Scopus indexed journals about career development in vocational graduates in the period 2018-2023 is considered fluctuating, a significant increase occurred in 2019 until its peak in 2020, while in 2020 to 2021 the number of publications decreased by 12%. Promoting student learning motivation and creativity through the design and development of interdisciplinary human-computer interaction systems is the article on career development of vocational graduates that has the highest number of citations. The journal that contains the most articles on career development of vocational graduates is Center for International Research on Education Systems, Victoria University, Melbourne, Australia. The journal that contains the most articles related to career development in vocational graduates is the United States. The results of the mapping analysis using VOSViewer software revealed two themes related to career development in vocational graduates, namely "self-efficacy" and "skills development" which are still rarely researched and become novel themes in research. These themes can be an opportunity to conduct further research.

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