

Bibliometric Analysis of Academic Studies on Student Support Systems in Open and Distance Learning ¹

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Submitted by: 12.06.2023

Accepted by: 15.11.2023

Article Type: Research Article

Abstract

The aim of this research is to conduct a bibliometric analysis of educational studies utilising Student Support Systems (SSS) in Open and Distance Learning, as indexed and scanned in the Web of Science (WoS) database under SCI-Expanded, SSCI, and A&HCI. The study employs descriptive and bibliometric analysis methods including journal articles exported as a .txt file from the WoS database. The data (6.366 open-access articles between 2013 and 2023) have been mapped using the VOSviewer. The research findings indicate that the majority of educational studies involving SSS in Open and Distance Learning are constituted by articles, with the number of publications beginning to rise from 2017 and the highest number of publications occurring in 2021. The authors receiving the most shared citations in this field have been identified as Dragan Gasevic, Sanna Jarvela, Abelardo Pardo and Jonna Malmberg respectively. The countries producing the most publications related to Student Support Systems in Open and Distance Learning are, in order, the USA, Australia, the People's Republic of China, Taiwan, Spain, Canada, and Turkey. From the perspective of country citation analysis, the USA has received the most citations and the institutions receiving the most citations are the University of Hong Kong in Hong Kong, Monash University in Australia, Beijing Normal University in the People's Republic of China, and the National University of Science and Technology in Taiwan. Finally, the most frequently used keywords in published studies have been found to be, in order, higher education, e-learning, online learning, and learning analytics.

Keywords: Student Support Systems, Open and Distance Learning, Online Learning, E-Learning, Higher Education

Citation: Ayan, E., Toy, F., Türktan, O. ve Gökçe, M. (2023). Bibliometric analysis of academic studies on student support systems in open and distance learning. *Anadolu Üniversitesi Sosyal Bilimler Dergisi*, 23(4), 1489-1516.

¹ This study does not require ethics committee permission.

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Açık ve Uzaktan Öğrenmede Öğrenci Destek Sistemleri Üzerine Yapılan Akademik Çalışmaların Bibliyometrik Analizi

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Başvuru Tarihi: 12.06.2023

Kabul Tarihi: 15.11.2023

Makale Türü: Araştırma Makalesi

Öz

Bu araştırmada Web of Science (WoS) veri tabanında SCI-Expanded, SSCI ve A&HCI indekslerinde taranan ve Açık ve Uzaktan Öğrenmede Öğrenci Destek Sistemlerinin kullanıldığı eğitim araştırmalarının bibliyometrik analizini yapmak amaçlanmıştır. Betimsel ve bibliyometrik analiz yönteminin kullanıldığı araştırmada çalışmalar belirli kriterlere göre sınırlandırılmış ve WoS veritabanından .txt dosyası olarak dışarıya aktarılmıştır. Veriler VOSviewer programıyla haritalandırılmıştır. 2013-2023 yılları arasında yayımlanan 6.366 açık erişim verisine sahip makale incelenerek analiz edilmiştir. Araştırma sonucunda Açık ve Uzaktan Öğrenmede Öğrenci Destek Sistemlerinin olduğu eğitim araştırmalarının çoğunluğunu makalelerin oluşturduğu, yayın sayısının 2017 yılından itibaren yükselmeye başladığı, en çok yayının 2021 yılında yapıldığı tespit edilmiştir. İlgili alanda en çok ortak atıf alan yazarların sırasıyla Dragan Gasevic, Sanna Jarvela, Abelardo Pardo ve Jonna Malmberg olarak tespit edilmiştir. Açık ve Uzaktan Öğrenmede Öğrenci Destek Sistemleri ile ilgili en çok yayın yapan ülkeler Amerika Birleşik Devletleri, Avustralya, Çin Halk Cumhuriyeti, Tayvan, İspanya, Kanada, Türkiye, Güney Afrika, Güney Kore ve İtalya olarak sıralanmıştır. Ülke atıf analizi açısından en çok atıf alan ülkenin Amerika Birleşik Devletleri olduğu, kurum atıf analizi açısından ise en çok atıf alan kurumların Hong Kong'daki Hong Kong Üniversitesi, Avustralya'daki Monash Üniversitesi, Çin Halk Cumhuriyeti'nde bulunan Pekin Normal Üniversitesi ve Tayvan'daki Ulusal Bilim ve Teknoloji Üniversitesi olduğu görülmüştür. Son olarak yayımlanan çalışmalarda en çok kullanılan anahtar kelimelerin sırasıyla yüksek öğrenim, e-öğrenme, çevrimiçi öğrenme, öğrenme analitiği, işbirlikçi öğrenme, motivasyon, karma öğrenme, öğrenci katılımı, kendi kendini düzenleyen öğrenme, geri bildirim, covid-19 ve makine öğrenimi olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: Öğrenci Destek Sistemleri, Açık ve Uzaktan Öğrenme, Çevrimiçi Öğrenme, E-Öğrenme, Yüksek Öğrenim

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Introduction

Student Support Systems (SSSs) constitute an important asset in the structure of Open and Distance Learning (ODL) and are open to change (Garfield and McHugh, 1978; Sewart, 1993; Simpson, 2018; Bozkurt, 2013). Their aim is to build a strong connection between learners and educational institutions by accommodating and overcoming specific difficulties that students may face in ODL environments. Although advanced technology grants students the freedom to pursue their education at their own pace, time, and location without constraints affiliated with traditional classrooms, it can also create some complexities for some learners who might need additional help navigating through the academic field (Sewart, 1993; Jacklin and Le Riche, 2009; Newberry, 2013).

The notion of SSSs encompasses numerous services and tools intended to enhance students' academic experiences. These systems go beyond resolving administrative or technical problems but also contribute to improving learners' academic performance, motivation, and overall development. They depend vastly on technology-driven platforms such as diverse communication channels leveraging online resources that support dynamic interactive features. By incorporating SSSs into their curriculum package, educational institutions provide students with access to various resources such as tutoring services, mentorship ventures, and technological guidance alongside the availability of requisite learning materials. Consequently, students have immediate access to critical assistance thereby aiding them throughout their learning journey (Symeonides and Childs, 2015).

Therefore, it is vital to implement techniques that stimulate minds and improve our current workforce by guiding them toward unlimited accomplishments. Meeting today's challenges is only possible if we stay ahead and continuously upgrade our educational systems with technology. Incorporating these enhancements will increase active participation while also instilling within people a passion for lifelong learning (Bramble et al., 2018; Abdunabi et al., 2019; Abubakari et al., 2020; Adeshola and Agoyi, 2022). Once the definition and importance of SSSs have been established, a review is necessary to provide a more comprehensive understanding of how these systems are implemented in distance education-related research articles. In this context, this study examines academic articles focusing on SSSs from a scholarly mapping and bibliometric analysis perspective, exploring current trends, co-authorship, organisational and country-based collaborations, and keyword distributions. We believe that, compared to classical short review studies, a more detailed insight into the scientific studies conducted in the mentioned fields can be obtained with this type of data analysis approach.

Purpose and Research Questions

As distance learning programs become more prevalent, the incorporation of SSSs holds a greater level of significance. These systems extend various advantages, including heightened student involvement. This increased participation can serve as a vital tool to help students master difficult tasks and ultimately surpass anticipated results - leading to an overwhelming sense of personal accomplishment. The advantages of combining Artificial Intelligence (AI) and Machine Learning (ML) with human interventions are abundant, especially in the context of contemporary teaching practices. These models encourage open communication among participants and help students gain significant benefits that enrich their knowledge, leading to future success and new career opportunities.

In a society where progress is inevitable, the ability to adapt and develop intellectually has become a crucial factor. This trait can lead people towards well-deserved careers and leadership roles that are essential in today's world, reflecting a global perspective focused on advancing civilizations everywhere. With the current technology of AI and ML coming into play, social connections have been established on an extensive scale. This development requires individuals to tackle intimidating challenges with steadfast determination.

SSSs are indispensable parts of open and distance education processes. These systems basically offer the service of students in institutions and organizations and represent many sub-systems and structures from Learning Management System (LMS) to digital libraries, e-mail services to student affairs offices. Updates or changes made in these systems may have side effects that may directly affect the learning processes of the students in the system and therefore AI and ML-based models may produce better results (Chen, Zou, Xie, et al., 2022; Kayabaş, 2010; Xiaogang, 2018). However, there are not many studies in the literature on student support systems with AI and ML from a scientific mapping and bibliometric analysis perspective, even though there are lots of bibliometric works on mobile learning (Goksu, 2021), learning environments (Schoebel et al., 2021), learning analytics (Chen, Zou and Xie, 2022). In this regard, the aim of this study was to map co-authorship (both country and organization-based), co-citation, and frequently used keywords of academic articles published in the last 10 years (from 2013 to 2023) in the Web of Science platform-related to student support systems.

This study aims to fill a significant research gap, as no previous study in the relevant literature examines Student Support Systems related to Open and Distance Learning in this context. Therefore, this study serves the gaps in the literature on using Student Support Systems in the field of Open and Distance Learning. Firstly, it aims to fill the gap in the literature by presenting the size and trends of publications in this field through a bibliometric analysis. It also aims to contribute to current developments in this field by analysing publication trends over time. Examining the citation and collaboration relationships between relevant countries and institutions can help us understand the opportunities for international cooperation and the global development of the field. Therefore, this study makes a significant contribution in terms of filling the gaps in the literature on Student Support Systems related to Open and Distance Learning, analysing trends and understanding international relations. The research questions (RQ) in this regard are as follows:

1. What is the **distribution of the published articles** regarding the SSSs in distance education from 2013 to 2023 in Web of Science?
2. What is the **distribution of the journals** of published articles regarding the SSSs in distance education in Web of Science?
3. What are the **languages of published articles** regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
4. What are the **common categories of published articles** regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
5. What is the **distribution of the countries of published articles** regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
6. What is the **distribution of the topics published articles** regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
7. Who are the **most cited (citation and co-citation) researchers** in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
8. What is the **distribution of co-authorship and country relations** in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
9. What is the **distribution of authorship affiliations** in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?
10. What is the **distribution of the most common keywords** in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

Literature Review

In the 21st century world, where the transition from the information society to the network society, changes and transformations are taking place very rapidly in the field of distance education as in all fields. The Covid-19 pandemic, which has a very important place in the realisation of these transformations in recent years, has changed the dynamics of the traditional education process and caused distance and blended education to gain importance. In other words, education has become lifelong by becoming independent from time and space. In this process of change, independent learning/individual responsibility is at the forefront as learners are away from time and space in open and distance learning (Gorsky and Blau, 2009). In this independent learning process, learners need more support services.

The support systems are all the services provided for the creation of learning groups and the continuation of the education of individuals in this group (Kumtepe et al., 2019). According to Mills and Tait (2004), support services should be considered as a part and complement of education as a whole. Berge (1995), on the other hand, divides support services into pedagogical, technical, social, and management according to the needs of the learner. Pedagogical support includes activities, materials, etc. to help learners realize their goals. At this point, pedagogical support is important to prevent the sense of loneliness and isolation of learners.

According to Simpson (2018), support services are all the activities carried out in the process after the learner receives the course materials. According to a study conducted by Usun (2004), it was emphasized that cultural characteristics affect learner support. Moreover, creating strategies by considering cultural characteristics, individual needs and values is vital to providing and improving learner support in online learning environments (Usun, 2004).

SSS is one of the most important components of e-learning to retain learners (Ludwig-hardman and Dunlap, 2003). The main objectives of the SSSs include learner retention, learner success, and satisfaction. SSSs play an important role in increasing students' academic success and providing support in their educational processes. Moreover, it is stated that students are more motivated, participate more actively in classes, and have a more positive learning experience when they receive the support and assistance they need (Herman et al., 2015). With the increase in access to student support services, student satisfaction increases.

Student support is the totality of all services that contribute to the acquisition of knowledge and skills for students to achieve success in their academic careers. In other words, as Mills and Tait (2004) services are all the elements and activities prepared to contribute to the cognitive, affective and managerial aspects of learners (Ludwig-hardman and Dunlap, 2003).

The teaching and learning processes, learner behaviour, motivation, readiness, and other factors affect learner or student support. Therefore, the concept of support services should be considered as a whole. According to Mills and Tait (2004), support services should be considered as a part and complement of education as a whole. They see student support services as all activities and services in education aimed at facilitating and supporting learning processes. For this reason, they did not explain support services by focusing on only one area. Also, they categorise support services under three main headings: cognitive (academic and technical), affective, and administrative.

Cognitive level is defined as supporting and improving learning by designing learning resources and course materials in the most effective way for individual learners. It is related to the development of students' learning and cognitive skills. An effective level is defined as support services that support students in a motivational context and provide a sense of loyalty and belonging to the institution. Social media groups, alumni

associations, discussion forums, etc. can be given as examples. Social interaction is very important for creating an online learning environment. Administrative level is defined as support services that are student (user) friendly, transitive and efficient, transparent information management systems and administrative processes.

In distance education, the learner cannot physically share the space as in traditional education. For this reason, in the learner-centred distance education model, interactions between individuals and self-directed interactions should be provided by communication technologies. At the same time, the teacher is only one of the learning resources. The learner should also be able to access information by interacting with other learners and using different learning resources such as libraries and other databases (Stewart, 2019). At this point, support services ensure the correct and effective use of resources.

Another aim of learner support services should be to make learners feel valued and at home. In addition, learner support services remove the isolation of the learner and increase his/her motivation. In order to provide these services, support services should be personalized, simple and interactive in a structure specific to the learner. At this point, it should not be ignored that each learner comes from a different cultural structure. It is important to create support services by taking into account the cultural values of each learner and their differences with other learners (Ludwig-Hardman and Dunlap, 2003). Since each individual is different, learning resources should be transferred independently. Appropriate support services should be provided according to the learner's performance. From another point of view, learner support services endeavour to improve the distance learning skills of the learner and to adapt to the different climates in which the learner lives.

Amid an ever-increasing number of scientific studies, keeping track of developments and drawing general conclusions can be daunting. However, understanding current trends in research is essential. This has led to bibliometric analysis becoming more popular as a means of accurately assessing articles (Ma et al., 2021; Zatorski and Fichna, 2017). By using comprehensive statistical evaluations, organized investigations have become possible in recent years with methods such as bibliometric analysis (Pereira et al., 2019; Ayanoglu et al., 2021). It allows us to isolate important issues or patterns from large amounts of publications and predict what topics will gain attention down the road.

Bibliometric analysis (Donthu et al., 2021) methods are vital tools that enable detailed analyses of multiple studies, clarifying major research trends within sub-disciplines from social and educational sciences. Analyzing this information quantitatively implores the opening of pathways for understanding real-world research applications across nearly all borders (Zhao et al., 2018). Innovative visual maps have surfaced demonstrating unique data facets that lead to heightened comprehension, albeit, there are gaps widespread in ever-changing fields related to student support systems. Additionally, pinpointing the primary sources informing a field will aid aspiring researchers looking to conduct further analysis by offering guidance gleaned from prior studies. With this goal in sight, this study seeks to undertake bibliometric analysis highlighting implications involved with student support systems among features rich enough to merit comprehensive scrutiny as the development of literature contributory pieces aligned with essential requisites is being considered (Cen et al., 2020).

Methodology

As a method, a systematic scientific mapping methodology was implemented in this work, and data visualisations and analysis were applied on 6.366 journal articles queried and exported from the Web of Science platform. Understanding the efficiency and influence of such systems as SSSs on the academic experience of students requires that we examine its implications. By utilizing such a methodological technique as bibliometric analysis, it can be investigated the current literature in this area effectively. This analysis utilises

statistical techniques and mapping methodologies to enable us to visually explore numerous elements involved in understanding research on student support systems such as authors, countries, institutions, studies conducted along with various journals which have contributed considerably (Herman et al., 2015; Bass et al., 2016).

Moreover, descriptive analysis approaches may also present viable alternatives for identifying noticeable trends both past and current within studies related to educational or student support services through conducting an exhaustive examination. Furthermore utilizing bibliometrics offers a rather advantageous solution by providing access globally to compendious amounts of data thereby lending itself well towards investigating academics related specifically towards student support systems ultimately resulting primarily or nominally would aid towards identifying any foreseeable gaps requiring further exploration (Sheard, 2009; Ellegaard and Wallin, 2015; Lima and Filho, 2019).

Data Collection

There is a diverse selection of databases that enable the acquisition of bibliometric analysis data. The most well-known among them consist of Web of Science (WoS; formerly Web of Knowledge), Scopus, ISI, Google Scholar, Microsoft Academic, PubMed, NLM, Springerlink and so on (Martín-Martín et al., 2018). For this study's purposes, the WoS database was used to obtain bibliometric analysis data. Bibliometrics is popularly done through WoS as it encompasses diversified fields with its content and is created by ISI in the year 1950 which is produced presently by Clarivate Analytics (Chiroma et al., 2020). The abundance of citation indexes such as A&HCI (Arts and Humanities Citation Index), SSCI (Social Science Citation Index) and SCI (Science Citation Index) make WoS an optimal choice for bibliometric studies (Meho and Yang, 2007). WoS is a particular digital platform which offers access to numerous databases that contain reference and citation data from academic articles, reviews, editorials, chronologies, abstracts, proceedings, technical papers in a variety of academic disciplines from 1900 to present. The platform includes 87 million (core collection) and 200 million (journals, books, and proceedings) (platform) records and 13 million data sets (Matthews, 2023). The users are allowed to create flexible query sets on the platform and compile and export query results in different formats. In this study, the query sets were produced by using various keywords from the related context. The first results obtained from these query sets were then filtered and more consistent results were obtained.

A query set with the keywords (*student support**, *learner support**, *support service**, *support system**, *student support system*, *learner support system*, *student support service*, *learner support service*, *distance education*, *e-learning*, *online learning*, *higher education*, *artificial intelligence*, *ai*, *machine learning*, *ml*, *natural language processing*, *NLP*) and with the *topic* filter only was created. As a result of the first query, more than 1,737,000 published articles were reached. In the filters applied after the first query process, a filter covering the years 2013 and 2023 was applied first, and then *Subject Area* and *Document type* filters were applied. *Social Sciences*, *Computer Science*, *Psychology*, *Arts and Humanities* and *Decision Sciences* were determined as subject areas. As *Document type*, only the Article option is preferred. In addition to these filters, a Keyword filter was created again and the results (N= 6.366) were listed again according to the query context (see Figure 1).

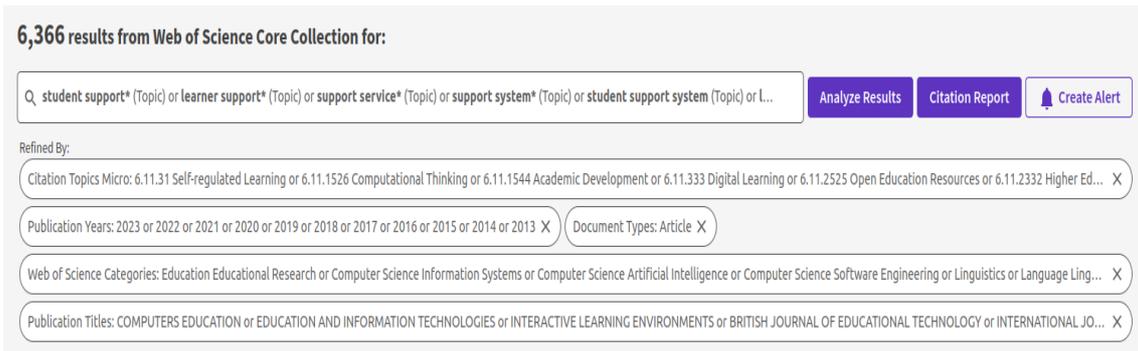


Figure 1. Query set produced in Web of Science

Data Visualization

In this work, various data visualization tools are used to explore the data exported from WoS platform in .txt format. WoS platform has a built-in visualization tool for the descriptive statistics, from which we benefited to extract distributions of the articles, journals, and languages of the articles. *Tableau* (2023) was preferred to visualize the distribution of the publications according to the countries where the researches were conducted (see Figure 6). In order to visualise the bibliometric data, VOSviewer, which is a popular bibliometric data analysis tool developed by Van Eck and Waltman (2010, 2023) and supports the analysis such as co-authorship, co-citation and co-occurrence (Arslan, 2022), was used.

Data Analysis

A multitude of established databases are available to aid in the collection of data for bibliometric analysis, like WoS, ISI, Scopus, Google Scholar, PubMed, NLM and Medline (Harzing and Alakangas, 2016). For this particular study, information was sourced from the WoS database. As a method of analyzing the acquired data gathered from these sources both descriptive and bibliometric analysis were used. Frequency analyses were performed to display descriptive statistics and frequencies were visualized with WoS and Tableau tools. VOSviewer software was used to perform the bibliometric analyses (Arslan, 2022) and the analyses specified in the table below were performed (Table 1).

Table 1
List of analyses with selected parameters performed on VOSviewer

	Type of Analysis	Unit of Analysis	Minimum Number of Documents of an Author/Organization /Country/Keyword	Minimum Number of Citations of an Author/Organization /Country	Number of Results Meeting the Threshold
1.	Co-authorship	Authors	5	4	268
2.	Citations	Authors	5	6	268
3.	Co-authorship	Country	5	2	84
4.	Co-authorship	Organization	5	2	549
5.	Co-occurrence	Author keywords	5	--	930

Limitations

The bibliometric analysis study focusing on the utilisation of implications of student support systems was carried out using data accessed through the WoS program between the years 2013-2023. Given that the research utilised open access data, no ethical committee approval was obtained. Due to the nature of the study, informed consent or ethics committee approval was not required. The study adhered to all rules defined within the context of the “Regulations on Scientific Research and Publication Ethics of Higher Education Institutions”. Any potential violation related to the article is the responsibility of the authors.

Findings and Discussion

In this section, the results found according to the research questions are given.

RQ-1: What is the distribution of the published articles regarding the SSSs in distance education from 2013 to 2023 in Web of Science?

The number of articles started as 380 in 2013 and gradually increased by 2015 and reached a peak of 907 in 2021. By 2022 the number of articles has reversely started to decrease. To date, 212 articles have been published in 2023 (see Figure 2 below).

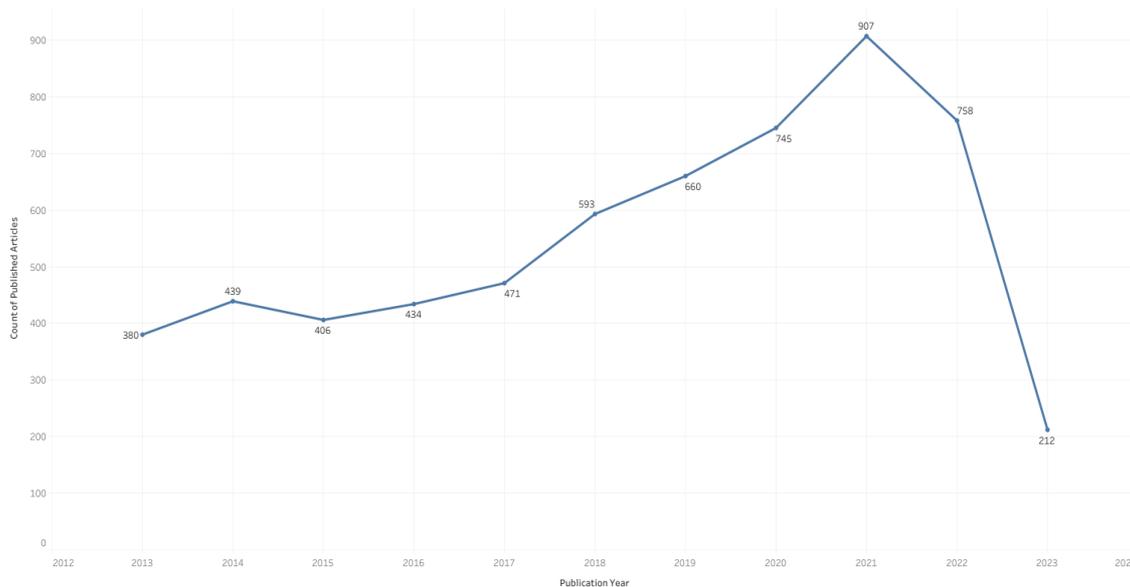


Figure 2. Distribution of Published Articles within Years

RQ-2: What is the distribution of the journals of published articles regarding the SSSs in distance education in Web of Science?

The distribution of articles within academic journals in Web of Science was uncovered through VOSviewer as shown in Figure 2. *Computers & Education* was ranked at the top with 349 articles followed by *Education and Information Technologies* with 256 articles. The top five journals with the highest number of papers were found as *Interactive Learning Environments* with 220, *Education Sciences* with 151 and *IEEE Access* with 104 (see Figure 3 below).

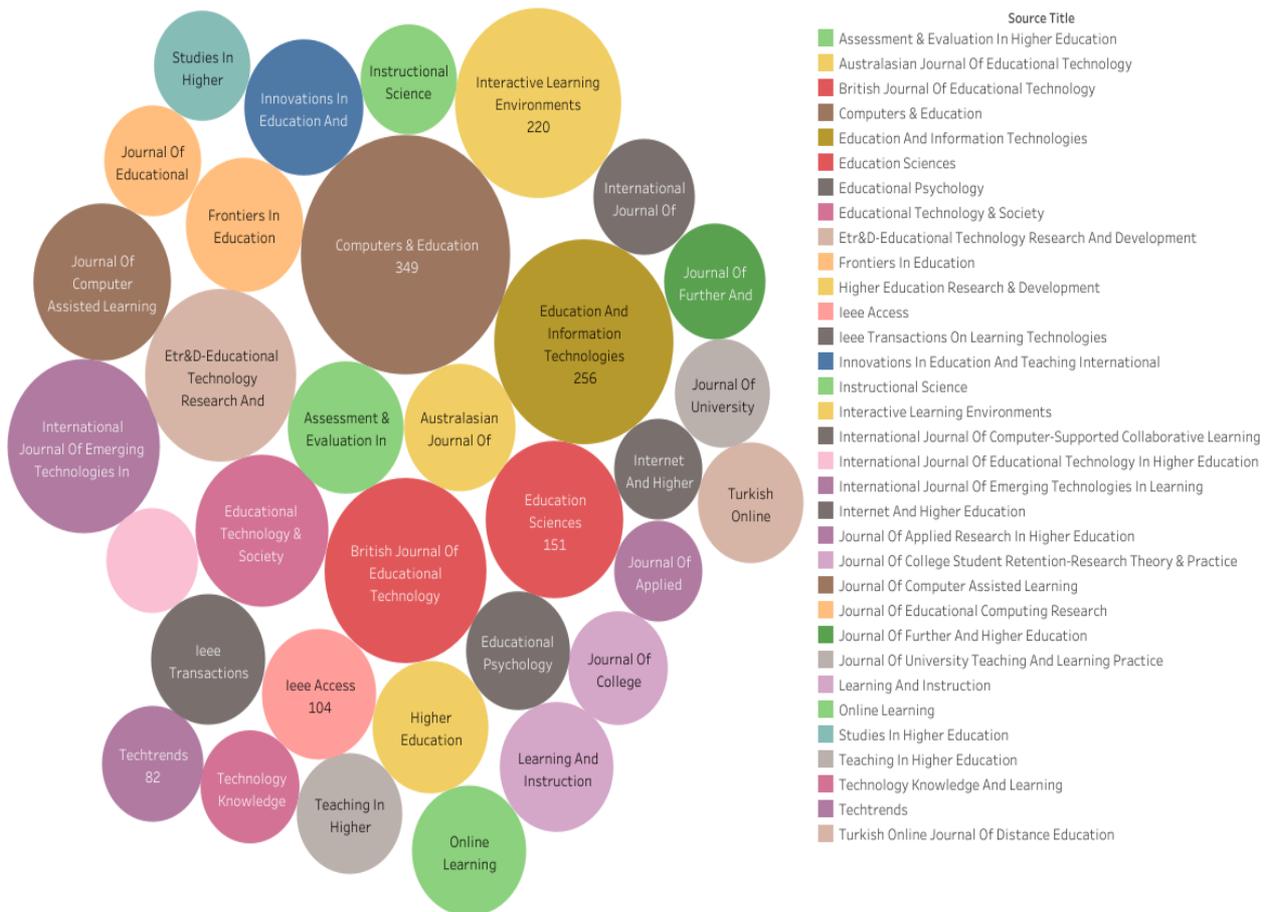


Figure 3. Distribution of Articles within Academic Journals

RQ-3: *What are the languages of published articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?*

The languages of the articles are given in Figure 3. English is the most common language used in the articles and followed by Russian, German, Spanish and Ukrainian consecutively. Out of 6.366 articles, 4.747 in mere Education & Educational research topics were presented in English (see Figure 4 below).

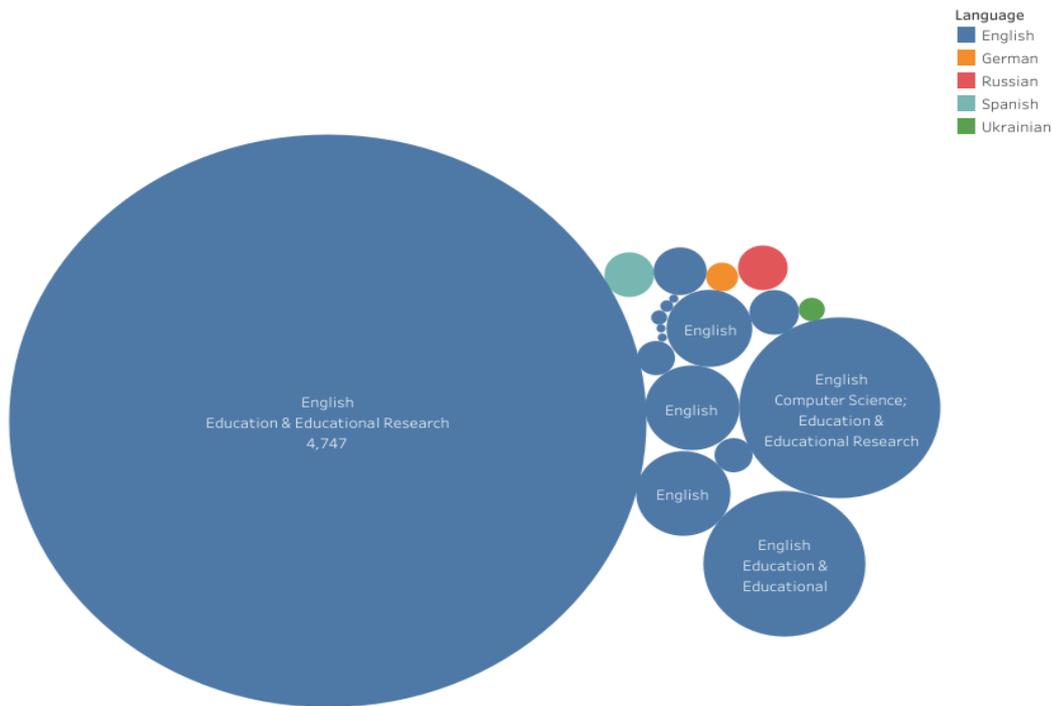


Figure 4. Languages of the Articles

RQ-4: What are the common categories of published articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

Regarding the categories of selected articles within the scope of this study, setting of Web of Science was operated. The distribution of categories was revealed as shown in Figure 5. Educational Research (6.104) and Computer Science Interdisciplinary Applications (473), Psychology Educational (312), Computer Science Information (179) and Engineering Electrical Electronic (123) were successively ordered (see Figure 5 below).



Figure 5. Web of Science Categories

RQ-5: What is the distribution of the countries of published articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

Regarding the distribution of countries for published articles in Web of Science within 2013 and 2023, totally 126 countries were revealed to host these publications as illustrated in Figure 6 above. The number of published articles from top 10 countries constitutes more than half ($n=5127$) of all selected papers. As it is shown in Figure 6, the USA is ranked at the top with 1548 papers, followed by Australia (698) and China (599). The remaining countries from the top 10 can be listed as follows; Taiwan (352), Spain (349), Canada (398), Türkiye (217), South Africa (147), South Korea (131) and Italy (107) (see Figure 6 below).

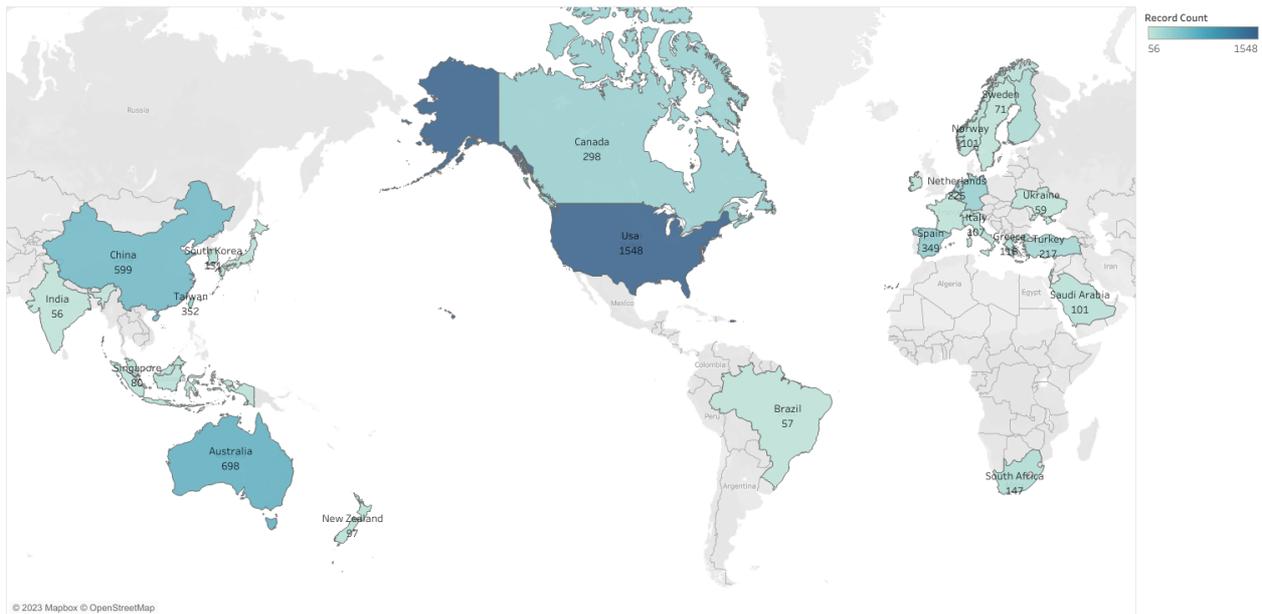


Figure 6. Distribution of Countries

RQ-6: What is the distribution of the topics published articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

As for the distribution of topics for published articles between 2013 and 2023 within the scope of this study, categories were analysed in Web of Science with a minimum record of 1 article. The top 6 categories were found as self-regulated learning (4.946), academic development (530), computational thinking (410), digital learning (289), open education resources (125) and higher education (66) (see Figure 7 below).



Figure 7. Distribution of Topics

RQ-7: Who are the most cited (citation and co-citation) researchers in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

To disclose the citation and co-citation analysis in selected articles in Web of Science, the co-authorship network was initially analysed via VOSviewer. The co-authorship relation refers to cooperation of 2 authors at minimum for a publication. In this analysis, the following parameters define in Table 1 were selected. The minimum numbers publication and citation of an author were kept as 4 and 5 respectively. And type of analysis was co-authorship while unit of analysis was authors.

With these settings, of 15.331 authors, 268 passed these thresholds. When the results are examined, although the number of published documents, citation and Total Link Strength (TLS) values of the authors vary from each other, it was determined that the top 10 authors were ranked according to the TLS values as shown in the Table 2 below.

Table 2
List of Top Ten Authors with Respect to Co-authorship

Author	Documents	Citations	Total Link Strength
"gasevic, dragan"	35	952	69
"pardo, abelardo"	20	532	41
"rahimi, seyedahmad"	7	63	31
"smith, ginny"	7	58	30
"dawson, shane"	9	313	28
"shute, valerie"	6	63	26
"kuba, renata"	5	57	25
"fischer, frank"	13	267	24
"yang, xiaotong"	5	49	24

For a more detailed analysis, VOSviewer network visualization was used. As shown in Figure 8, the co-authorship network started to have a boom by 2016 and the clusters that the authors revealed in the context of co-authorship were displayed. According to this analysis, it became possible to see that there were many clusters formed by writers over the years and around which writers the clusters have developed in recent years. Accordingly, the author, named Ryan S. Baker, represented an important part of the clusters in recent years.

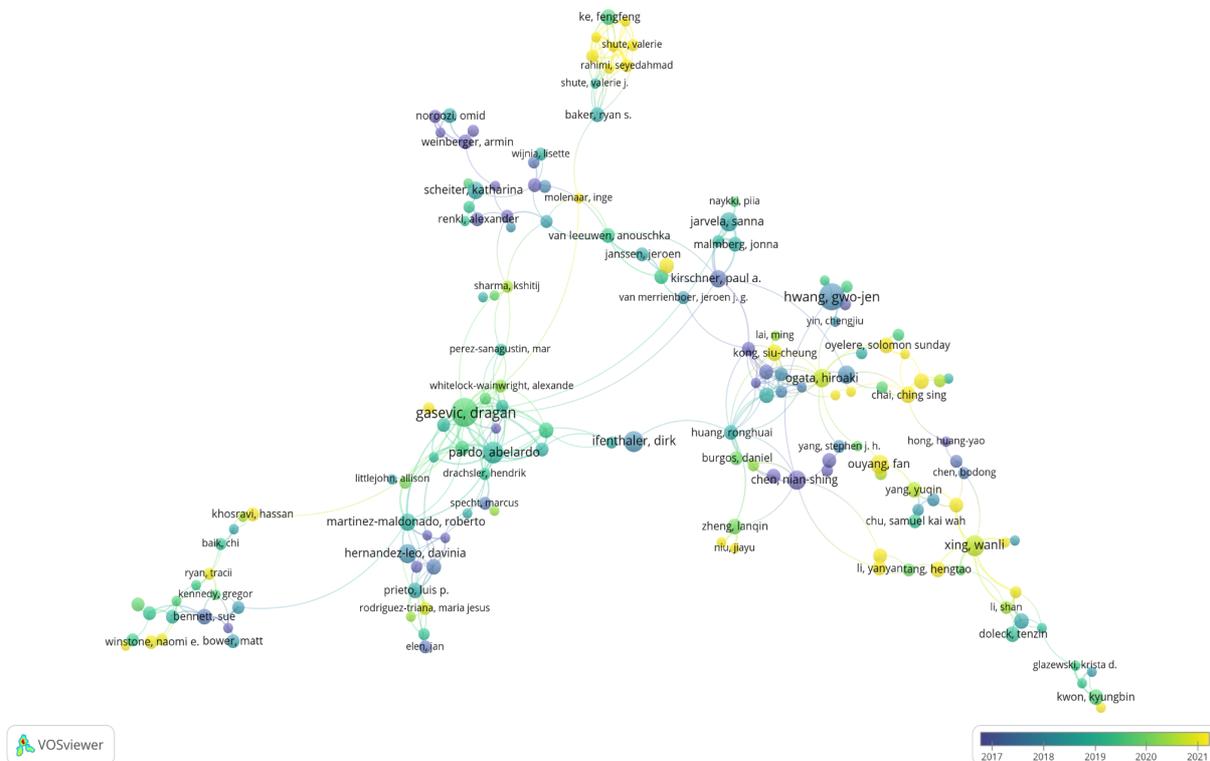


Figure 8. Co-authorship Relations in Web of Science Data

For the analyses of citation and co-citation networks, the same parameters in Table 1 above were determined. In these analysis the types of analysis were citation and co-citation and the unit of analyses was authors and cited authors.

As shown in Table 3 below, considering the TLS values of the citation analysis the authors such as Dragan Gasevic, Sanna Jarvela, Abelardo Pardo and Jonna Malmberg appeared as the top five writers with higher ranks in this analysis.

Table 3
List of Top Ten Authors with Respect to Citation

Author	Documents	Citations	Total Link Strength
"gasevic, dragan"	35	952	352
"jarvela, sanna"	15	667	276
"pardo, abelardo"	20	532	252
"malmberg, jonna"	9	496	241
"jarvenoja, hanna"	6	378	201
"kirschner, paul a."	13	538	194
"dawson, shane"	9	313	164
"fischer, frank"	13	267	153
"yilmaz, ramazan"	11	215	147

Regarding the values of the TLS for the co-citation analysis, the authors such as BJ Zimmerman, PR Pintrich, EL Deci, RM Ryan, and A Bandura were determined as the top five writers with higher ranks in this analysis (see Table 4 below).

Table 4
List of Top Ten Authors with Respect to Co-citation

Author	Citations	Total Link Strength
"zimmerman, bj"	1069	26746
"pintrich, pr"	834	21708
"deci, el"	769	19343
"ryan, rm"	770	19015
"bandura, a"	896	18142
"mayer, re"	869	17066
"winne, ph"	500	16691
"garrison, dr"	922	16090
"reeve, j"	557	16003

In order to better understand the citation and co-citation relationships in the studies, it would be more useful to look at the network mappings in Figure 9 and Figure 10 below. Figures essentially include a node for each author. The coloured clusters in Figures group the authors in terms of their publication frequencies. These clusters of nodes are linked to the others according to their citation relations and values of TLS. The size of a node calls for the TLS for an author, which means the bigger a node, the stronger link that author owns.

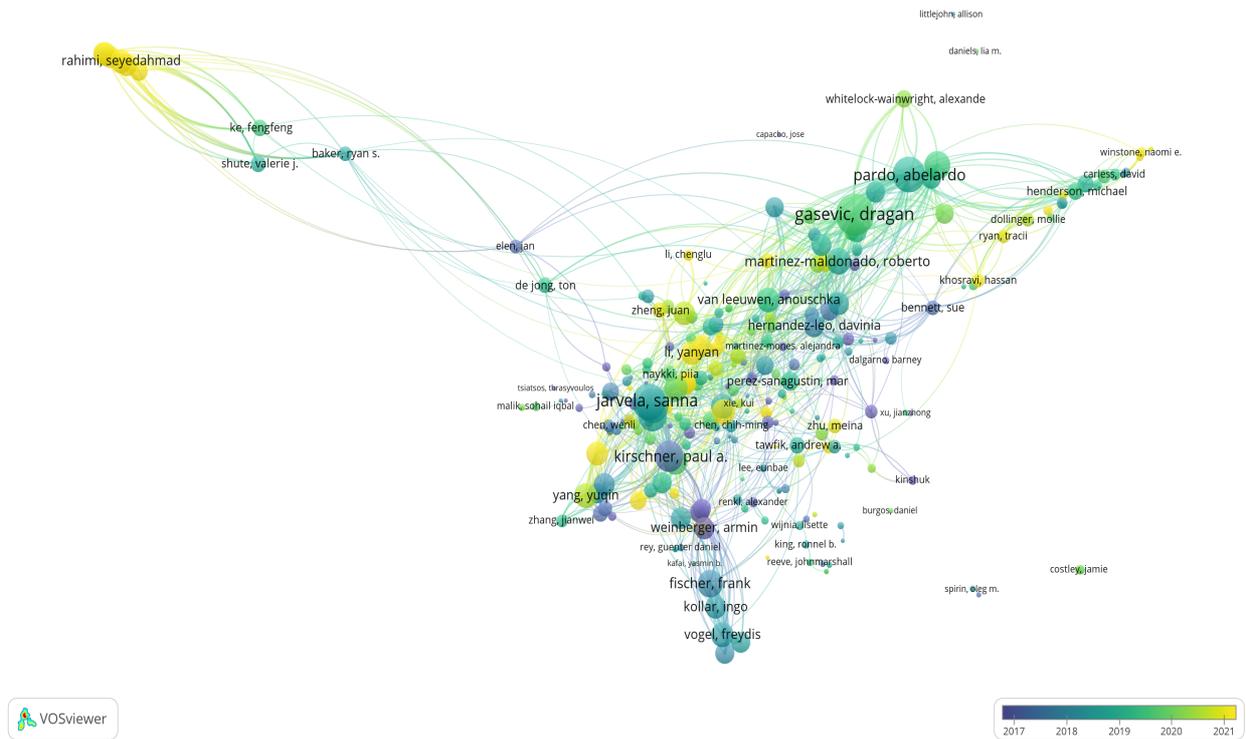


Figure 9. The visualization of citation network

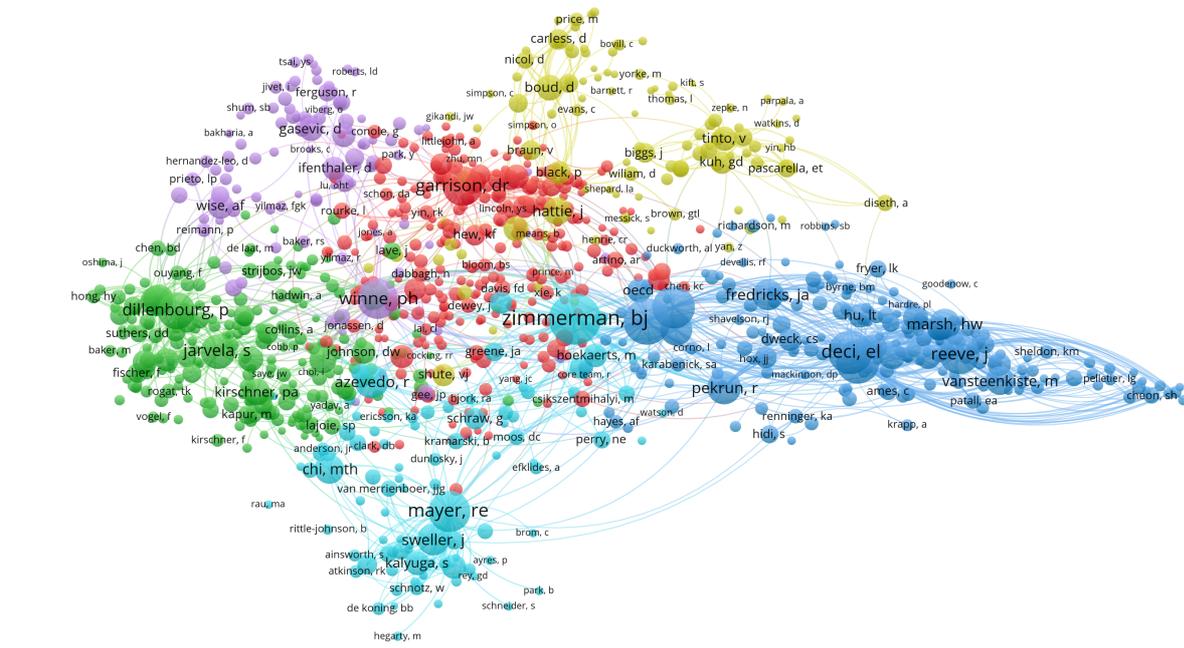


Figure 10. The visualization of co-citation network

RQ-8: What is the distribution of co-authorship and country relations in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

We also analysed co-authorship regarding country relations by considering values of TLS. The minimum numbers of documents and citations were set 5 and 2 successively using VOSviewer. We reached 84 countries meeting our threshold. The USA (1548 documents and 511 TLS), Australia (698 documents and 425 TLS), China (599 documents and 351 TLS), England (533 documents and 359 TLS) and Taiwan (352 documents and 149 TLS) were ranked top five countries regarding the number of publications. As for the network relation of co-authorship of countries, coloured clusters are shown in Figure 9. The USA (511 TLS) appears the most mentioned country with the bigger TLS values and it has co-authorship relations mostly with China (351 TLS), Türkiye (77 TLS), England (359 TLS), Spain (217 TLS), Australia, Netherlands (222 TLS), France (85 TLS), Brazil (58 TLS), Mexico (55 TLS), Japan (82 TLS) as shown with green clusters. The green clusters also point out that Japan, Egypt, India, Ukraine, South Africa have had a clear collaboration among themselves (see Figure-11).

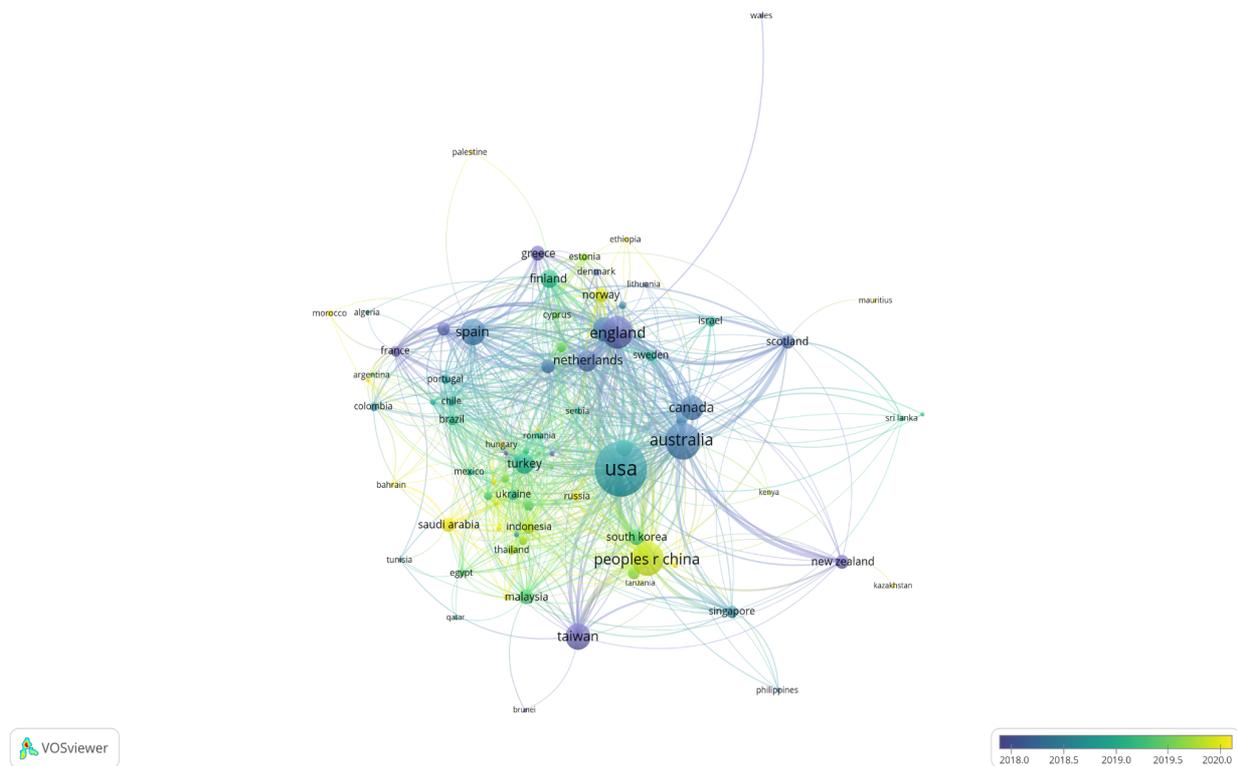


Figure 11. Co-Authorship and Country Relations in Web of Science Data

RQ-9: What is the distribution of authorship affiliations in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

An analysis of author affiliations was implemented and a total of 3.481 institutions were found as the minimum number of authors for any affiliation was adjusted to 1. The top twenty-five list of affiliations and number of authors are given in Figure 10. RLUK Research Libraries (UK) ranks the first with 324 authors preceding State University System of Florida with 110 authors, which is followed by University of Hong Kong with 99 authors. It is evidently to be inferred from Figure 12 that the institutions from the USA and UK appeared to outweigh those from other countries.



Figure 12. Distribution of Author Affiliations

As for the co-authorship and organization relations, we set the minimum numbers of documents and citations as 5 and 2 respectively and 549 organizations met the threshold out of 3668 organizations. VOSviewer analysis disclosed Beijing Normal University (121 TLS, 868 citations and 85 documents), Hong Kong University (115 TLS, 1523 citations and 99 documents), Monash University (112 TLS, 1204 citations and 69 documents), National Taiwan University Science & Technology (107 TLS, 845 citations and 60 documents) appear as the most mentioned organizations. These universities are also positioned at the core of the distribution network accounting for their collaboration with other universities (see Figure 13 below).

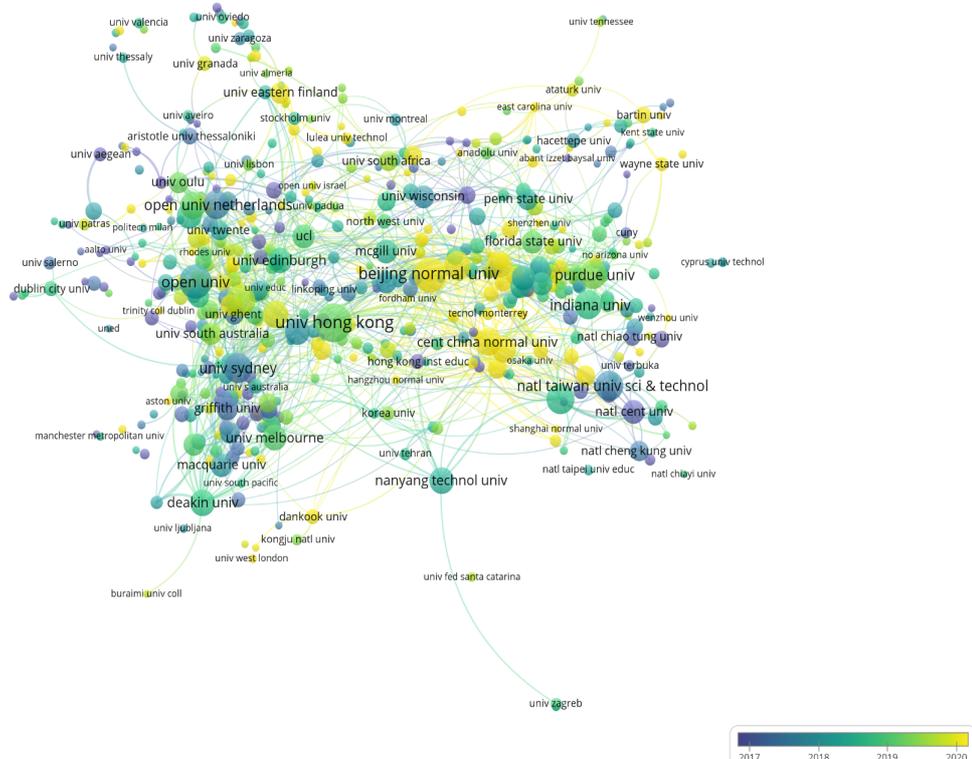


Figure 13. Co-Authorship and Organization Relations in Web of Science Data

To reveal the distribution of funding organisations for published articles, we conducted an analysis using Web of Science categories filtering funding agencies and adjusting 2 records for each organisation at minimum and totally reaching 25 organisations. All the organisations were given in Figure 14. The highest number of funding was constituted by National Science Foundation (NSF) with 243 publications, followed by Ministry of Science and Technology Taiwan (152), NSF Directorate for STEM Education Edu (113), National Natural Science Foundation of China (NSFC) and the European commission (83).



Figure 14. Distribution of Funding Organizations

RQ-10: What is the distribution of the most common keywords in the articles regarding the SSSs in distance education between 2013 and 2023 in Web of Science?

Looking at Figure 15, VOSviewer analysis setting 5-time co-occurrence of keywords in all sections included 930 keywords meeting the selected threshold and yielded the most commonly used keywords. Higher education ($f=540$), e-learning ($f=454$), online learning ($f=332$), learning analytics ($f=280$), collaborative learning ($f=221$), motivation ($f=220$), blended learning ($f=201$), student engagement ($f=161$), self-regulated learning ($f=160$), feedback ($f=136$), covid-19 ($f=130$) and machine learning ($f=124$) are the most frequent keywords. Additionally, such a mapping of frequent keywords points out that machine learning has made more and more contributions to related fields of study in recent years and has begun to take an important place among the latest trends as shown in Figure 15.

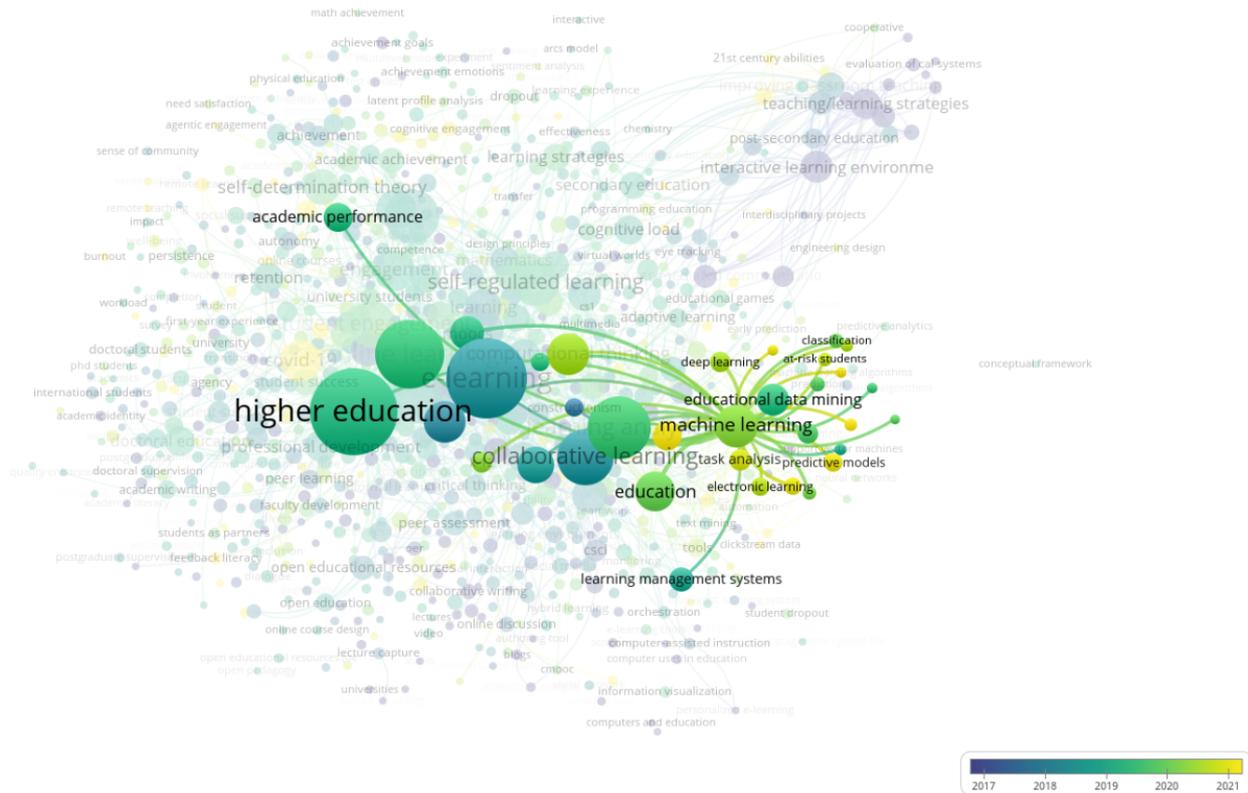


Figure 15. Distribution of Frequent Keywords

Conclusion

This bibliometric study delves into the vast academic literature of student support systems in higher education and draws attention to noteworthy developments from 2013 to 2023 in terms of the implications in the relevant literature. The research consisted of analysing a collection of 6,366 articles using the WoS database, providing extensive insight into this significant domain (Meho and Yang, 2007; Martín-Martín et al., 2018; Matthews, 2023).

One of the discoveries is that English is recognised as the primary language for academics (Lenhard et al., 2006; Vinther & Rosenberg, 2012; Alastrué & Pérez-Llantada, 2015). This underscores the importance of nurturing diverse scholarly environments and elevating multi-lingual researchers' presence in upcoming research. A few dynamic journals like *Computers & Education*, *Education and Information Technologies*, *Interactive Learning Environments*, *Education Sciences* and *IEEE Access* (Afify, 2020) were identified in this investigation. It's believed that these journals played critical roles when it comes to scholastic conversations on related topics (Borg, 2001).

While examining publications from around different regions worldwide emphasized divergent contributions globally with heavy outputs coming from countries such as America, Australia and China accentuating potential benefits in increasing cross-national collaborations while researching relevant, user-generated content across various educational programs (Mosbah-Natanson and Gingras, 2014).

Most importantly through keyword analysis focusing on appearing recurrently keyword themes drawn up during this provided case study *higher education*, *e-learning*, *online learning*, *learning analytics*, *collaborative learning*, *motivation*, *blended learning*, *student engagement* along with *self-regulated learning*, *feedback*, *covid-*

19 and machine learning underline essential domains concerning interest for scholars throughout provided scope experiencing active document detailing description displays interesting niches existing for exploring further movements/entities becoming known anytime soon (Herman et al., 2015; Steinmayr et al., 2019; Wang et al., 2022; Khaldi et al., 2023; Mosbah-Natanson and Gingras, 2014).

The experiences of students demonstrate the noticeable benefits of innovative support systems (Bozkurt, 2013) in higher education, emphasizing the potential for future ground-breaking outcomes in this field. An extensive analysis of previous and current research projects yields insight into possible avenues for further investigation as well. In conclusion, this comprehensive exploration offers a complete overview of both past and present student support systems implemented within higher education. Its aim is to provide a strong foundation upon which to build future awareness and develop strategies that prevent issues from arising during changes. A scrupulous examination is deemed indispensable when aiming to achieve desirable outcomes and efficacies in the context of higher education. By embracing and enhancing benchmarks set by these student-centric aid schemes, aspirations are built around robust targets aimed at advancing improvement efforts around these tools. Attaining success routinely hinges on progress achieved through such measures found within these student-centered systems leading towards amelioration overall within the larger scope here propagated via higher learning provisions. Accordingly, successfully supporting students (Symeonides and Childs, 2015) is an integral imperative while journeying toward discoveries critical to academic progressiveness rendering improved infrastructures beyond expectations achievable for each learner passionate about academia today.

Recommendations

- *Expansion of the Linguistic Scope:* Although English is currently the primary mode of academic communication in this field, it is suggested that future research endeavours should incorporate and support works in other languages. This could facilitate a more holistic global outlook on student support systems in higher education.
- *Enhanced Interdisciplinary Collaboration:* Given the distinctive interest in the intersection of education and technology - as evidenced by publication patterns - a recommendation has been made emphasising continuing to nurture collaboration between the Education and Computer Science disciplines.
- *Promotion of Cross-national Studies and Collaborations:* Currently, the USA, Australia, and China lead in publications within this subject area. However, stimulating international collaborations can ensure enhanced variety in insights for student support systems.
- *Focus on Underrepresented Themes:* Whilst themes like "e-learning", "motivation" and "engagement" predominate ongoing discussions, attention towards newer subjects such as adaptive learning systems or impact of AI in student support systems could provide intriguing unexplored motivations to researchers.
- *Supporting Continued Research Funding:* In order to recognise further importance surrounding how student support mechanisms continue to drive enhancements toward positive educational outcomes, funding institutions must make investing in these topics a priority.
- *Application of Findings:* As presented herein aid policymakers utilising prevailing research structure strive forward towards designing impactful education experiences built upon incorporating newly pertinent frameworks (not only trends) that strategies around enhancing aspects related to inclusive engagement encouragement toward motivated exploration leading up vast learning offerings potential consisting pivotal findings providing rich learning outcomes based enriched student life experience.
- *Further Bibliometric Studies:* With the rapidly changing landscape of the field, it would be advantageous to frequently conduct bibliometric analyses to oversee shifts in research inclinations,

noteworthy contributors and emergent topics. Analysing trends will allow one to stay up-to-date on developments in student support systems within higher education.

- *Expansion of the Dataset and Analysis*: The data set used in this study is limited only to data obtained from the WOS database. More descriptive insights can be obtained by examining data obtained from other databases in the context of student support systems, which is the subject of the study. Therefore, we recommend that data sets and results obtained from other sources should be compared for more accurate analyses.

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Genişletilmiş Özet

Amaç

Bu çalışmanın amacı, student support systems (SSS) üzerine odaklanarak yükseköğretimdeki öğrenci deneyimindeki etkilerini anlamaktır. Çalışma, SSS'lerin akademik deneyim üzerindeki etkinliğini incelemek için bir bibliyometrik analiz yöntemi kullanılmaktadır. Bu alanda yapılan araştırmaların değerlendirilmesi, SSS'lerin öğrencilerin akademik başarılarını ve deneyimlerini nasıl etkilediğini anlamamıza yardımcı olabilir. Bu çalışma, mevcut literatürü sistematik bir şekilde inceleyerek SSS'lerin öğrenci deneyimine olan katkılarını ve bunların neden önemli olduğunu ortaya koymayı amaçlamaktadır. Böylece, yükseköğretim kurumları ve politika yapıcılar, öğrencilerin destek sistemlerini geliştirme ve iyileştirme konusunda daha bilinçli kararlar alabilirler.

Tasarım ve Yöntem

Bu çalışma, uygulamalı bir araştırma türü olarak gerçekleştirilmiştir. Araştırmanın tasarımı, Öğrenci Destek Hizmetlerinin (SSSs) yükseköğretimdeki öğrenci deneyimine etkisini anlamayı amaçlamaktadır. Çalışmada bibliyometrik analiz yöntemi kullanılarak Web of Science platformunda yer alan 6.366 akademik makale üzerinde veri analizi ve görselleştirme yapılmıştır. Öncelikle, çalışma için Web of Science veri tabanından SSS'ler hakkında yapılan araştırmaları temsil eden 6.366 makale seçilmiştir. Bu makaleler, çeşitli konu başlıklarını ve disiplinleri kapsamaktadır. Veri toplama sürecinde, bu makalelerin bibliyografik bilgileri elde edilmiş ve analiz için kullanılmıştır.

Araştırmanın tasarımı, bibliyometrik analiz tekniklerini içermektedir. Bu teknikler, makalelerin yayın trendlerini, dil ve ülke dağılımlarını, en sık kullanılan kavramları ve yazarlar arası iş birliklerini belirlemek için kullanılmıştır. Ayrıca, makalelerin içeriği ve temaları üzerinde yapılan analizler, SSS'lerin yükseköğretimdeki öğrenci deneyimine olan etkisini anlamaya yönelik bilgiler sağlamaktadır.

Bu çalışmada kullanılan yöntemler arasında, bibliyometrik analizler için yazılım araçları ve istatistiksel teknikler yer almaktadır. Bu araçlar, makalelerin metinlerinin analiz edilmesi, kelime frekansı ve ilişkili kavramlarının belirlenmesi, görselleştirmelerin oluşturulması gibi işlemlerde kullanılmıştır. Araştırmanın sınırlılıkları da göz önünde bulundurulmuştur. Veri toplama sürecinde sadece Web of Science veri tabanı kullanıldığı için diğer veri tabanlarından elde edilen makaleler dikkate alınmamıştır. Ayrıca, bibliyometrik analizlerin sınırlamaları da dikkate alınmalıdır. Bu analizler sadece erişilen makalelerle sınırlıdır. Bu yüzden sadece ilgili alan içerisinde değerlendirilmesi daha doğru olacaktır.

Bu çalışmanın tasarımı ve yöntemi, SSS'lerin yükseköğretimdeki öğrenci deneyimine olan etkisini anlamayı hedeflemektedir. Bibliyometrik analizler ve istatistiksel teknikler kullanılarak elde edilen bulgular, SSS'lerin yaygınlığı, etkisi ve önemi hakkında kapsamlı bilgi sağlamaktadır. Bu çalışma, ilgili alanda daha fazla araştırmanın yapılmasına ve SSS'lerin geliştirilmesine yönelik önerilerin ortaya konmasına katkı sağlamaktadır.

Bulgular

Bu çalışmanın bulguları, SSS'lerin yükseköğretimdeki öğrenci deneyimi üzerindeki etkilerini anlamak için yapılan kapsamlı bir analizi içermektedir. Verilerin analizi, Web of Science platformunda yer alan 6.366 akademik makale üzerinde gerçekleştirilmiştir.

Bulgulara göre, SSS'lerin yükseköğretimdeki öğrenci deneyimine olan etkisi çeşitli boyutlarda incelenmiştir. İlk olarak, SSS'lerin kullanımı ve yaygınlığı üzerine yapılan çalışmalar incelenmiştir. Bulgular, SSS'lerin yükseköğretim kurumlarında önemli bir rol oynadığını ve öğrencilerin eğitim sürecinde desteklenmelerine katkı sağladığını göstermektedir. Ayrıca, SSS'lerin öğrencilerin akademik başarısı üzerindeki etkisi incelenmiştir. Bu bağlamda, SSS'lerin öğrencilerin ders notları, sınav performansı ve mezuniyet oranları üzerinde olumlu bir etkiye sahip olduğu bulunmuştur. Öğrencilere sağlanan destek hizmetleri, onların akademik başarısını artırmakta ve eğitim hedeflerine ulaşmalarını desteklemektedir. Ek olarak SSS'lerin öğrencilerin psikososyal ihtiyaçları üzerindeki etkisi de incelenmiştir. Bulgular, SSS'lerin öğrencilerin duygusal iyilik hallerini, motivasyonlarını ve öz güvenlerini artırdığını göstermektedir. Öğrencilere sağlanan destek hizmetleri, stresle başa çıkmalarına, kişisel gelişimlerine ve genel yaşam tatminlerine olumlu yönde katkı sağlamaktadır. Son olarak SSS'lerin öğrencilerin sürdürülebilir başarı ve mezuniyet oranları üzerindeki etkisi de değerlendirilmiştir. Bulgular, SSS'lerin öğrencilerin eğitimlerine devam etmelerini ve başarıyla mezun olmalarını desteklediğini göstermektedir. Öğrencilere sağlanan destek hizmetleri, öğrencilerin eğitimlerine devam etme motivasyonlarını artırmakta ve onları mezuniyet yolunda desteklemektedir.

Bu bulgular, SSS'lerin yükseköğretimdeki önemini ve etkisini vurgulamaktadır. SSS'lerin öğrenci deneyimini olumlu yönde etkilediği ve öğrencilerin başarılarını artırdığı görülmektedir. Bu bulgular, yükseköğretim kurumları ve politika yapıcılar için SSS'lerin geliştirilmesi ve yaygınlaştırılması konusunda rehberlik sağlamaktadır. Ayrıca, ileri araştırmalara temel oluşturarak bu alanda daha fazla bilgi ve anlayışın geliştirilmesine katkıda bulunmaktadır.

Sınırlılıklar

Bu çalışmanın bazı sınırlılıkları bulunmaktadır ve bu sınırlılıkların dikkate alınması gerekmektedir. İlk olarak veri toplama sürecinde yalnızca Web of Science veri tabanı kullanılmıştır. Bu nedenle, diğer veri tabanlarındaki makalelerin veya kaynakların gözden kaçırılmış olma olasılığı vardır. Bu durum, çalışmanın sonuçlarının genel geçerliliğini etkileyebilir. İkinci olarak, çalışma örnekleme sürecinde belirli bir kriter kullanılmıştır. Bu kriterlere uyan makaleler üzerinde analizler yapılmıştır. Bu da çalışmanın sonuçlarının seçilen örnekleme üzerine sınırlı kalmasına neden olabilir. Farklı örneklemeler veya daha geniş bir örneklemin kullanılması farklı sonuçlara yol açabilirdi. Ayrıca, bu çalışma bibliyometrik analiz yöntemini kullanmıştır. Bu yöntem, makalelerin sayısal verilerine dayanarak analizler yapmayı içerir. Bu nedenle, çalışmanın bulguları ve sonuçları sadece mevcut verilere dayanmaktadır.

Son olarak bu çalışmanın yürütülmesi için belirli bir zaman çerçevesi ve kaynak sınırlaması vardır. Bu durum, daha geniş bir zaman aralığını veya daha fazla kaynağı kapsayan araştırmaların yapılamamasına yol açabilir. Bu sınırlılıklar göz önünde bulundurulmalı ve bu çalışmanın sonuçlarına ilişkin yorumlar yaparken dikkate alınmalıdır.

Öneriler (Teorik, Uygulama ve Sosyal)

Bu çalışmanın sonuçları çeşitli teorik, uygulama ve sosyal önerilere yol açmaktadır. Aşağıda, elde edilen bulgulara dayanarak yapılabilecek öneriler sunulmaktadır.

Teorik Öneriler: Bu çalışma, yükseköğretimdeki öğrenci destek hizmetlerinin önemini vurgulamaktadır. Bu bağlamda, teorik açıdan, gelecekteki araştırmaların bu alanda daha fazla derinlik kazandırabileceği ve yeni teorik çerçeveler geliştirebileceği önerilmektedir. Öğrenci destek hizmetlerinin etkilerini daha iyi anlamak için teorik modellerin ve yaklaşımların kullanılması, bu alanda ilerlemenin sağlanmasına yardımcı olabilir.

Uygulama Önerileri: Bu çalışmanın bulguları, yükseköğretim kurumları ve öğrenci destek hizmetleri sağlayıcıları için bazı pratik öneriler sunmaktadır. Öncelikle, öğrenci destek hizmetlerinin erişilebilirliği ve görünürlüğü artırılmalıdır. Öğrencilerin bu hizmetlerden haberdar olması ve kolaylıkla erişebilmesi önemlidir. Ayrıca, öğrenci destek hizmetlerinin çeşitliliği ve kapsamı genişletilmelidir. Öğrencilerin farklı ihtiyaçlarına cevap verebilecek çeşitli destek programları ve kaynakları sunulmalıdır.

Sosyal Öneriler: Bu çalışmanın sonuçları, yükseköğretimdeki öğrenci destek hizmetlerinin sosyal etkilerini vurgulamaktadır. Öğrenci destek hizmetleri, öğrencilerin akademik başarılarını ve kişisel gelişimlerini desteklemekle kalmayıp aynı zamanda toplumsal fayda sağlayabilir. Bu bağlamda, toplumun genelinde öğrenci destek hizmetlerine yönelik farkındalığın artırılması ve desteklenmesi önemlidir. Eğitim politikalarının bu hizmetlere yönelik kaynak sağlaması ve desteklemesi gerekmektedir.

Bu öneriler, öğrenci destek hizmetleri alanında ilerlemenin sağlanmasına ve öğrencilerin daha iyi desteklenmesine katkıda bulunabilir. Gelecekteki çalışmalar bu önerileri dikkate alarak daha kapsamlı bir şekilde araştırma yapabilir ve öğrenci destek hizmetlerinin etkinliği üzerinde daha fazla bilgi sağlayabilir.

Özgün Değer

Bu çalışmanın özgün değeri, yükseköğretimdeki öğrenci destek hizmetleri konusunda kapsamlı bir inceleme sunması ve bibliyometrik analiz yöntemini kullanarak bu alandaki literatürü sistematik bir şekilde değerlendirmesidir. Bu çalışma, mevcut literatürdeki boşlukları doldurmak, trendleri ortaya çıkarmak ve gelecekteki araştırmalar için yol gösterici bir kaynak sağlamak amacıyla gerçekleştirilmiştir. Öncelikle, bu çalışma öğrenci destek hizmetleri alanındaki yayınları kapsamlı bir şekilde analiz etmiştir. Web of Science veri tabanında bulunan 6.366 makale üzerinde yapılan analizler, alandaki önemli araştırma konularını ve yayın trendlerini ortaya çıkarmıştır. Bu çalışma, bu alanda gerçekleştirilen araştırmaların dağılımını, tematik odakları ve coğrafi dağılımlarını açıkça göstermektedir. Dahası, bu çalışma öğrenci destek hizmetleri konusundaki mevcut literatürü eleştirel bir şekilde değerlendirmiştir. Öğrenci destek hizmetlerinin etkinliği, erişilebilirliği, çeşitliliği ve sosyal etkileri gibi konular ele alınmış ve önemli bulgular elde edilmiştir. Bu çalışma, araştırmacılar, uygulayıcılar ve politika yapıcılar için kapsamlı bir kaynak olarak hizmet edebilir ve öğrenci destek hizmetlerinin geliştirilmesi ve iyileştirilmesi için temel bir referans noktası olabilir.

Sonuç olarak bu çalışmanın özgün değeri, yükseköğretimdeki öğrenci destek hizmetleri alanında geniş kapsamlı bir inceleme sunması ve alandaki araştırmaların trendlerini ve önemli konularını açığa çıkarmasıdır. Bu çalışma, ilerideki araştırmaların yapılması için temel bir kaynak sağlayabilir ve öğrenci destek hizmetlerinin daha etkin bir şekilde geliştirilmesine katkıda bulunabilir.

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