



Research Growth of Engineering Faculty Universitas Negeri Padang: A Bibliometric Study of Journal

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Abstract

This research aimed to conduct a comprehensive literature review of all papers from the beginning of time published by the Faculty of Engineering at Universitas Negeri Padang and indexed in the SINTA database using bibliometrics analysis. It started with a query to the DOI (Digital Object Identifier) database. The papers from this scholarly publication may be accessed here. A total of 1094 papers from 7 journals were collected. Each paper published by the Engineering Faculty at Universitas Negeri Padang receives an average of 0.42 citations. Given the insignificance of this average, it seems likely that the publication's contribution has yet to be fully recognized and has only had a little effect on the global state of knowledge. According to the findings, Universitas Negeri Andalas researchers collaborate the most with their peers around the country. Contrast this with the declining frequency with which multinational teams work together. With 38 articles published and ten citations obtained, Ahmaddul Hadi of the Informatics Department stood out as the most productive author. Research conducted by this faculty has been widely disseminated due to its publication in the reputable academic journal Inovasi Vokasi Dan Teknologi (INVOTEK).

Keywords: Bibliometrics, Research Trend, Dimensions, Universitas Negeri Padang

1. Introduction

Investigating the quantity and quality of scientific output generated by universities and scientific institutes is a crucial criterion for measuring their degrees of scientific performance at the current time [1]. It is essential to examine the scientific behavior of researchers using a variety of techniques in order to discover and promote the finest goods to scientific communities. It is because scientists create several scientific documents annually. In light of this, it is necessary to examine the scientific conduct of researchers [2]. There are several ways to accomplish this objective. Examples of such methods are bibliometric analysis and scientific mapping techniques. The scientific and technical communities depend mainly on bibliometrics, the analysis of future trends and gaps in knowledge, for knowledge management and decision-making. It enables us to evaluate an institution's research output using bibliometrics and data visualization [3][4].

Universitas Negeri Padang (UNP) results from IKIP Padang's metamorphosis into a university. Since its founding on October 23, 1954, the UNP has undergone several changes. There are now over 42,000 students and 1,242 lecturers. These instructors are scattered throughout eleven faculties, 108 areas of study, and postgraduate programs [5]. The Faculty of Engineering at the Universitas Negeri Padang aims to become a distinguished and worldwide renowned faculty in Technology and Vocational Education (TVET), vocational sectors, and engineering. The Faculty of Engineering offers seven Diploma Programs, ten Undergraduate Programs, and two Graduate Programs. In light of this, it is vital to analyze all scientific articles generated by this faculty in great detail. In addition to identifying past, present, and future estimates and their strengths and weaknesses, this study's findings may also be helpful for institution policymakers.

Rarely do academic institutions undertake bibliometric analyses. According to research done at Iran's Alzahra University, the disciplinary development of its experts was unequal and centered in a few areas [6]. Another study conducted at the University of Gujarat found that, despite the participation of foreign scholars in the university's research, the institution has tremendous space for improvement in this specific field. Universities have much to gain from engaging in international collaborative endeavors, as it will not only raise the research output of their faculty but also allow them to promote an increase in the number of citations for their publications [6].

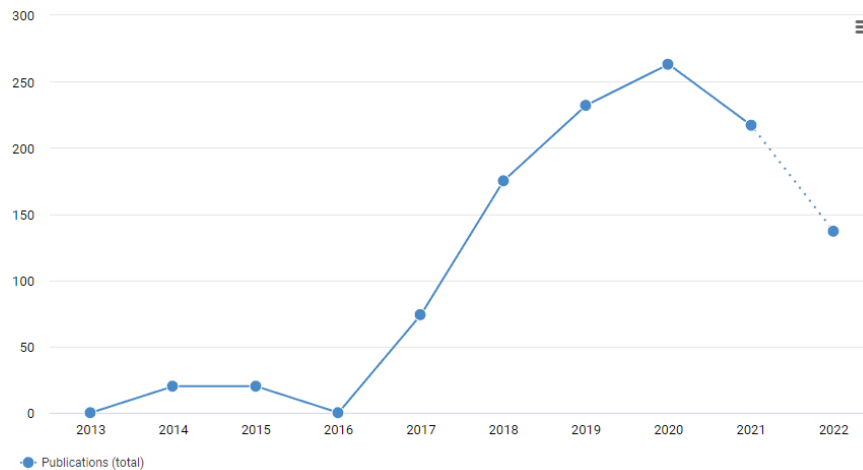


Figure 1. The number of publications published in Faculty of Engineering at the Universitas Negeri Padang (Seven Journal) from 2013 to 2022 [7]

This study's goal was to thoroughly examine all academic papers published by Faculty Engineering Universitas Negeri Padang and included in the SINTA database from its beginning to the present.

2. Method

The information for this study came from the Dimensions database, retrieved on November 6, 2022. Dimensions are one of the world's most famous and large citation databases. More than one hundred million publications are included in the Dimensions database. These include scholarly journal articles, books, book chapters, preprints, and conference proceedings, among other types of publications. All papers are contextualized with connected data sets, financing, publications, patents, clinical trials, and policy documents [7]. We chose journals that were published by the Faculty of Engineering at the State University of Padang based on criteria that were included in the Indonesian Science and Technology Index (SINTA). The seven journals that were produced as a direct result of this process are as follows: Vocational Electronics and Informatics Engineering (VOTETEKNIKA), Journal of Electrical and Vocational Engineering (JTEV), Journal of Vocational and Technological Innovation (INVOTEK), Journal of Information Technology and Education (JTIP), Journal of Civil Engineering and Vocational Education (CIVED), TEKNAMEKANIK, and Journal of Automotive Engineering and Vocational Education (AEEJ).

Initially, information was collected using the Digital Object Identifier (DOI) search area. This area gives access to the journal's scientific articles. In the end, 1094 papers were retrieved from seven journals—the format of the exported documents as CSV. All the articles have been exported in CSV format; each has complete records and correctly cited citations. The study utilized 1094 articles, all of which were analyzed by the RStudio software, explicitly designed for bibliometrics research [8][9][10][11][12],[13]. After collecting the bibliographic information from the scientific papers of Universitas Negeri Padang researchers, the scientific publishing process and the citations they obtained were investigated.

The scientific publication procedure and the citations acquired were analyzed after gathering bibliographic information from seven journals of Engineering Faculty Universitas Negeri Padang. Biblioshiny and other features of the bibliometrics package in the RStudio software were used to conduct this study's analysis. VOSviewer, an open-source software tool for building and visualizing bibliometric networks, is also employed in co-occurrence [14][15].

3. Result and Discussion

For analysis, the R Studio was used, namely the Biblioshiny and other functions of the Bibliometrics Package. Co-occurrence also makes use of VOSviewer, which is an open-source software tool that was developed to construct and examine bibliometric networks.

Table 1. Statistics and important facts

Description	Results
Main Information:	
Period	2014-2022
Sources (Journals)	7
Articles	1094
Average years from publication	2.55
Average citations per article	0.42

DOI: <https://doi.org/10.29207/joseit.v2i1.5017>

Authors

Authors	1504
Authors of single-authored documents	67
Authors of multi-authored documents	1437
Collaboration Index	1.4

3.1 Analysis of the Author

Table 2 lists the ten most prolific authors associated with this institution. This list may be used to get a better understanding of the high-productivity academics who are researching a variety of subjects.

Table 2. Top ten authors

No.	Name	Articles	Total Citation
1	Ahmaddul Hadi	38	10
2	Thamrin	37	4
3	Dedy Irfan	37	12
4	Yasdinul Huda	36	13
5	Denny Kurniadi	32	19
6	Titi Sriwahyuni	30	12
7	Khairi Budayawan	29	4
8	Hanesman	28	0
9	Putra Jaya	27	7
10	Almasri	23	1

The top 10 authors in the total number of published publications are shown in Table 2. The Informatics Department's Ahmaddul Hadi emerged as the most prolific author, with 38 articles published and ten citations received throughout his career. While Dedy Irfan of the Technology and Vocational Education Department finished in third place with 37 publications and 12 citations, Thamrin of the Electronic Engineering Education Department came in second place with 37 papers but just four citations.

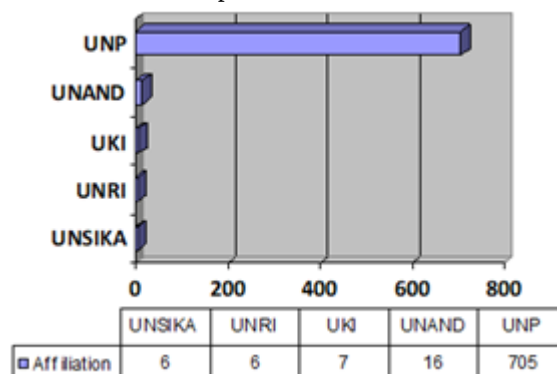
After determining the productivity of authors from seven engineering journals, the h-index must be calculated to determine the research impact of each author. The h-index, often known as the Hirsch index, evaluates the influence of a scientist rather than a publication. The h-index is defined as the most significant value of h such that an author or journal has produced at least h articles that have each been referenced at least h times [16]. Recently, Jorge Hirsch developed the h index to quantify individual scientists' research achievements. The new measure has garnered considerable interest in the scientific community [17][18][16].

Table 3. Top ten author's local impact based on Dimensions database

No.	Name	h_index	Total Citation	Number Articles	Per Year Start
1	Nizwardi Jalinus	3	19	4	2018
2	Denny Kurniadi	3	21	11	2015
3	Doni Tri Putra Yanto	3	33	4	2019
4	Muhammad Adri	2	8	6	2017
5	Ahyanuardi	2	9	2	2018
6	Ambiyar	2	11	3	2018
7	Andrizal	2	40	2	2017
8	Muhammad Anwar	2	7	3	2017
9	Ahmad Arif	2	12	3	2017
10	Abdul Aziz	2	5	3	2019

Nizwardi Jalinus, Denny Kurniadi, and Doni Tri Putra Yanto have the highest h-index for their combined number of articles across all seven journals. Since it uses a different computation than other databases, such as Google Scholar, Scopus, and Web of Science, the h-index calculation performed here may not be identical to the one produced by those other databases.

Table 4. Top five relevant affiliations



Regarding the most affiliations in journals published by the Faculty of Engineering, it is led by the Universitas Negeri Padang (UNP) own affiliation, which has contributed 705 articles. Next on the list is Universitas Singaperbangsa Karawang (UNSIKA), followed by Universitas Riau (UNRI), Universitas Andalas (UNAND), and Universitas Komputer Indonesia (UKI), as shown in Table 4. The findings of the VOSviewer visualization demonstrate that each author has co-authored at least ten papers, which indicates that 47 authors are closely related with co-authorship in 6 clusters and 169 linkages, as seen in Table 5 below [19].

Table 5. Co-authorship analysis in seven journals

Cluster	Number Authors	Most Author	Link	Total Link Strength
1	11	Elfizon	4	10
2	11	Titi Sriwahyuni	17	28
3	8	Ahmaddul Hadi	15	24
4	7	Dedy Irfan	17	21
5	6	Agariadne	3	11
6	4	Denny Kurniadi	11	16

The bibliometric study of authors with co-authorship produced a total of 1437 authors. It found that 47 of these authors are so tightly connected with co-authorship that each author has contributed to at least ten works. The overall connection strength among authors indicates that authors who are grouped in the same clusters often cooperate. Titi Sriwahyuni, the author, had by far the most substantial total link strength with a value of 28, followed by Ahmaddul Hadi and Dedy Irfan, whom both had a total link strength value of 24 and 21, respectively.

It is interesting to note that Ahmaddul Hadi, the most prolific author at Universitas Negeri Padang, can be located in the third cluster. In this cluster, he is responsible for 15 collaborative works and has a total link strength of 24. As a consequence, one might conclude that Ahmaddul Hadi does not have a link that is incredibly close to the primary authors of this association.

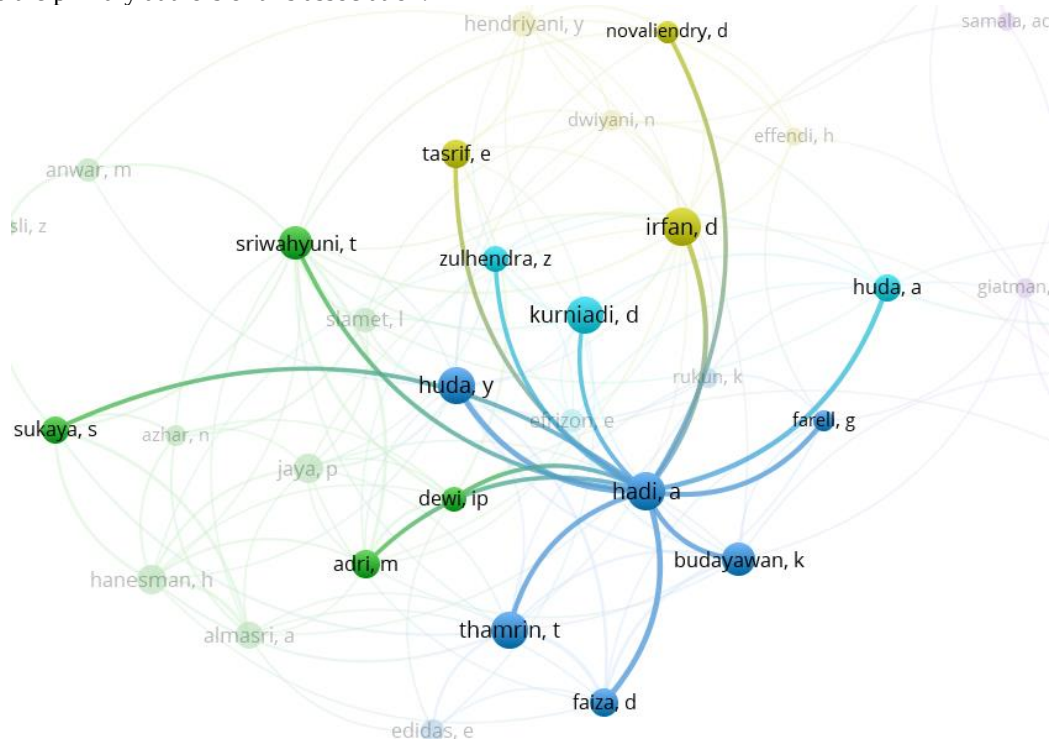


Figure 3. Ahmaddul Hadi in co-authorship analysis

Figure 3 illustrates that Ahmaddul Hadi is a part of cluster 3 and that his only connections are to clusters 2 and 6. This is only possible since collaboration is allowed within the same scientific field.

3.2 Analysis of the Journals

A total of 1094 papers have been published in seven different journals by the Engineering Faculty at Universitas Negeri Padang. This was followed by the Jurnal Teknik Elektro dan Vokasional (JTEV) with 189 publications and the Jurnal Inovasi Vokasional dan Teknologi (INVOTEK) with 161 publications. The Vocational Teknik Elektronika dan Informatika (VOTETEKNIKA) had the most papers, with 445 publications. Bradford's scattering law is an example of a classical analytic rule for categorizing journals and finding core journals in bibliometrics.

According to this hypothesis, the quantity distribution of professional documents in the linked journals is highly asymmetric or oblique. There is a clear quantity relationship between professional documents and the journals they belong to [20][21]. When these journals are evaluated correctly, it is possible to differentiate between the "core zone," which is the location where most of the articles were published, and the succeeding areas, which have the same number of papers as the core region.

Table 6. Journal Clustering Through Bradford's Law

Rank	Zone	Journal	N. Article	National Accredited SINTA
1	1	VOTETEKNIKA (Vocational Teknik Elektronika Dan Informatika)	445	SINTA 5
2	2	JTEV (Jurnal Teknik Elektro Dan Vokasional)	189	SINTA 4
3	2	INVOTEK (Jurnal Inovasi Vokasional Dan Teknologi)	161	SINTA 3
4	3	Jurnal Teknologi Informasi Dan Pendidikan	117	SINTA 3
5	3	CIVED (Journal of Civil Engineering and Vocational Education)	102	SINTA 4
6	3	TEKNOMEKANIK	56	SINTA 4
7	3	AEEJ (Journal of Automotive Engineering and Vocational Education)	24	SINTA 5

When categorizing journals for bibliometric study, the total number of published articles is considered a dividing factor (as shown in Table 6). At this point, each of the three zones may have a paper count that's somewhat distinct from the others. VOTETEKNIKA is the primary journal of this affiliation, as specified by Bradford's law for the circulation of documents. This table also compares the accreditation ratings received by each publication according to the Indonesian Science and Technology Index (SINTA).

Table 7 Journal impact measure

Rank	Journal	H Index	Total Citation	Citations Mean
1	INVOTEK (Jurnal Inovasi Vokasional Dan Teknologi)	6	184	1.14
2	VOTETEKNIKA (Vocational Teknik Elektronika Dan Informatika)	4	139	0.31
3	JTEV (Jurnal Teknik Elektro Dan Vokasional)	3	46	0.24
4	Jurnal Teknologi Informasi Dan Pendidikan	3	59	0.50
5	TEKNOMEKANIK	3	30	0.54
6	CIVED (Journal of Civil Engineering and Vocational Education)	2	11	0.11
7	AEEJ (Journal of Automotive Engineering and Vocational Education)	-	0	0

By doing more research on the citations of works published in journals, we will be able to determine which journals possess the best possible quality. Table 7 determines the total amount of citations received by each article [22]. As listed in Table 7, the ranking was obtained by comparing each article's total number of citations. INVOTEK (Jurnal Inovasi Vokasi Dan Teknologi) has been cited 184 times. It is a well-recognized journal that publishes a substantial quantity of scholarly research from this faculty.

Jurnal Inovasi Vokasi dan Teknologi (INVOTEK) is a double-blind peer-reviewed journal for research linked to Technical, Vocational, Education, and Training (TVET). This journal offers complete access to its material based on the belief that making research freely accessible to the scientific community and the general public promotes a more significant global flow of ideas and the expansion of expertise in Vocational Education and Training.

Table 8. Top authors of journal INVOTEK

Rank	Author	Publications	Citations	H-Index	Most Cite Article
1	Nizwardi Jalinus	10	16	3	"Peran Media Sosial Dalam Upaya Promosi Kesehatan: Tinjauan Literatur"[23]
2	Ahmad Arif	9	5	2	"Pengembangan Media Pembelajaran Interaktif Pada Sistem E-Learning Universitas Negeri Padang"[24]
3	Krismadinata	9	12	2	"Pengaruh Kompetensi Pedagogik Dan Profesional Guru Sekolah Menengah Kejuruan Pasca Sertifikasi Terhadap Komitmen Guru Melaksanakan Proses Pembelajaran"[25]
4	Hendra Dani Saputra	7	42	2	"Pengaruh Motivasi Terhadap Hasil Belajar Siswa SMK"[26]

Nizwardi Jalinus, who has authored ten articles and received 16 citations in 2022, is now regarded as the most productive author in the INVOTEK journal (Table 8). He is also the piece that has been quoted the most in this publication. Regarding the research category, the education category is the most prominent in this journal's collection of research topics (Figure 4).

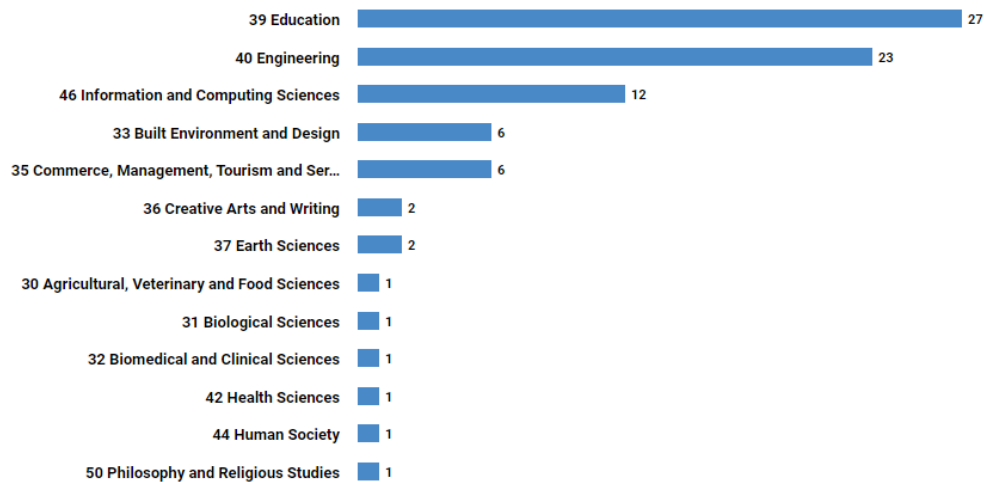


Figure 4. Documents by subject area

3.3 Trend Research

It is possible to extract a text's core ideas and substance by employing keywords. Using keywords, we can find hotspots for study in several scientific fields. The word "hasil belajar," which was used 127 times, was found to be used the most frequently. This was followed by the terms "mata pelajaran" (93) and "rancang bangun," which were found to be used the least (91). Researchers have a higher opportunity to discover and capture the relevant research problems, emerging trends, and research focuses when they employ keyword analysis. Using the VOS viewer as our data source, we construct a map based on the term co-occurrence of 1094 different articles.

VOSviewer is a software application that may be used to produce maps based on network data, display and analyze the resulting maps, and then export the results of these analyses. With the aid of VOSviewer, one can construct networks consisting of scientific articles, journals, researchers, research organizations, countries, keywords, or ideas. Items included within these networks may be related to one another in various ways, including but not limited to co-authorship, co-occurrence, citation, bibliographic coupling, and co-citation relationships [22][27][28].



Figure 5. Word cloud in title

According to the findings of an analysis that included extracting text from the titles of these seven journals, the term "berbasis" was found to be the one that appeared the most often. The terms "sistem," "belajar," and "pembelajaran" are listed next, as illustrated in the word cloud in Figure 5. It is possible to conclude that the study areas covered in these seven journals fall squarely under the educational category while most studies are conducted in the city of Padang and at SMK. The data shown in Figure 6 illustrates that the ratio of the size of the circular node to the frequency with which the keywords appear grows correspondingly. The degree to which a node is linked may be thought of as a representation of the link's overall strength. When there is a more considerable relevance to the relationship, there will be a greater likelihood that it will be cited many times on the same page.

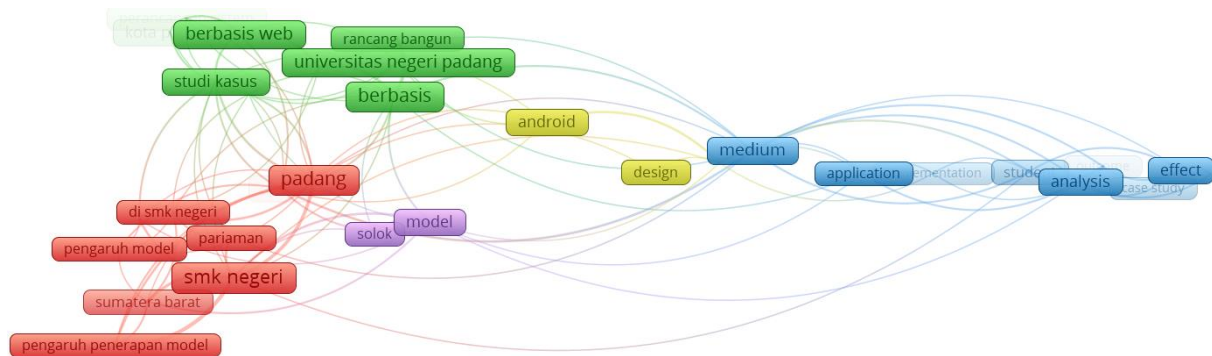


Figure 6. Co-occurrence term map based on title

Based on the title, the co-occurrence term map required at least five occurrences of a word and yielded 24 of the most relevant terms, which were then categorized into five major clusters and applied to 1094 articles. As shown in figure 6, Cluster 1 has the most entries (9) that contain the phrase "SMK Negeri" in the title, followed by Cluster 2 (9 items) that contain the word "berbasis web", Cluster 3 that contains the word "medium", Cluster 4 that contains the word "development," and Cluster 5 that contains the word "model." These five clusters serve as the foundation for their respective clusters. The amount of citations linked with each article has been found due to the study's keyword usage. According to the bibliometric study, these ten papers received the total citations. Table 9 provides the results.

Table 9. Articles with highest citation in Faculty Engineering journal

Rank	Citation	Author	Title	Journal
1	34	Saputra HD, 2018[29]	"Pengaruh Motivasi Terhadap Hasil Belajar Siswa SMK"	INVOTEK
2	25	Yanto DTP, 2019[30]	"Praktikalitas Media Pembelajaran Interaktif pada Proses Pembelajaran Rangkaian Listrik"	INVOTEK
3	12	Leonita E, 2018[31]	"Peran Media Sosial Dalam Upaya Promosi Kesehatan: Tinjauan Literatur"	INVOTEK
4	11	Jasman J, 2018[32]	"Effect of Strong Welding Flow on the Violence of Low Carbon Steel Results of SMAW Welding with Electrodes 7018"	TEKNOMEKANIK
5	8	Tanjung RE, 2019[33]	"Canva Sebagai Media Pembelajaran Pada Mata Pelajaran Dasar Listrik Dan Elektronika"	VOTETEKNIKA
6	8	Samala AD, 2019[34]	"Desain Dan Implementasi Media Pembelajaran Berbasis Mobile Learning Menggunakan Moodle Mobile App"	Jurnal Teknologi Informasi dan Pendidikan
7	7	Fitri RS, 2018[35]	"Perancangan Dan Implementasi Sistem Informasi Penjualan Komputer Dan Accessories Pada Toko Mujahidah Computer Berbasis Web"	VOTETEKNIKA
8	7	Amri M, 2020[36]	"Persepsi Mahasiswa Terhadap Penggunaan Quizizz Dalam Pembelajaran Akuntansi Konsolidasi Bank Syariah Di lain Ponorogo"	Jurnal Teknologi Informasi dan Pendidikan
9	7	Ahyanuardi A, 2018[37]	"Pengaruh Kompetensi Pedagogik Dan Profesional Guru Sekolah Menengah Kejuruan Pasca Sertifikasi Terhadap Komitmen Guru Melaksanakan Proses Pembelajaran"	INVOTEK
10	6	Aurora A, 2019[38]	"Pengaruh Penggunaan Media Pembelajaran E-learning terhadap Motivasi Belajar Mahasiswa di Universitas Negeri Padang"	JTEV

The article that had the most influence within the context of the study titled "Pengaruh Motivasi Terhadap Hasil Belajar Siswa SMK" which was published in INVOTEK (Jurnal Inovasi Vokasional Dan Teknologi) Vol 18 No 1 (2018) displayed in Table 9. The primary contact person for this piece of writing is Hendra Dani Saputra, who is now employed at Universitas Negeri Padang in the Automotive Engineering Education department. The same academic institutions contributed to the writing of the essay in a collaborative effort.

4. Conclusion

The Faculty of Engineering at Universitas Negeri Padang published a total of 1094 papers throughout 2014-2022, with an average of 2.55 articles being published each year, as shown by the data that was gathered from seven different journals. In the Dimensions database, the average number of citations received by each article published by the Engineering Faculty at Universitas Negeri Padang is 0.42. The fact that this average has a value that is too low to be meaningful suggests that the contribution made by the publication has yet to be acknowledged and that it has a minimal impact on the state of knowledge worldwide. Most articles were found in the field of education (201), next in the field of curriculum and pedagogy (181 publications), and finally in the field of information and computing sciences (177 publications).

The study results indicate that most collaboration occurs nationally with academics from Universitas Negeri Andalas. It is in contrast to the fact that international collaboration takes place less often. International collaboration was not found in these seven journals. Ahmaddul Hadi, who worked at the Informatics Department, emerged as the most prolific author during his career, with 38 papers published and ten citations earned. While Nizwardi Jalinus have the highest h-index for their combined number of articles across all seven journals. We will be able to identify the journals of the highest possible quality after we have completed more studies on the citations of works published in journals. A significant amount of the academic research carried out by this faculty is published in the peer-reviewed journal *Inovasi Vokasi Dan Teknologi (INVOTEK)*, a respected journal.

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