"Navigating the Training Landscape and its effectiveness: A Bibliometric Exploration of Research Trends and Innovations"

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ABSTRACT

This study conducts a comprehensive bibliometric analysis of research related to training effectiveness spanning the years 1962 to 2023. The analysis encompasses 1264 research papers retrieved from the Dimensions database, shedding light on the evolving landscape of training research. A noticeable surge in publications in recent years indicates that there is increased interest in training efficacy in the research setting. Remarkably, the United States is the leading contributor in terms of citations and documents, with the University of Michigan State at the top of the list. The analysis also identifies influential authors, such as Bakker, Arnold B., and notable sources like the Journal of Applied Psychology Work. Furthermore, the study provides insights into co-citation patterns among authors, revealing the interconnectedness of research in this field. Additionally, a content analysis of selected papers highlights various findings related to training effectiveness, including its impact on organizational commitment and employability. For practitioners, researchers, and policymakers, this bibliometric exploration is an invaluable tool that provides a thorough understanding of the state of training effectiveness research now and directs future directions in this important area.

Keywords: Training effectiveness, bibliometric analysis, training programs, organizational performance, influential authors, knowledge landscape

Introduction

Modern organizational strategies, which are intended to improve employee performance, skill sets, and overall productivity, include training and development as essential elements. Maintaining the most recent knowledge and abilities is essential for both individual career progress and organizational performance in the fast-paced business world of today. Consequently, there is currently a great deal of interest in training program effectiveness as a research topic. In 2016, $359 billion was spent on training by businesses globally (Glaveski, 2019). Businesses in the US paid more than those in any other country, making up the greatest portion of this expenditure. $87.6 billion in 2018 (Freifeld, 2018) compared to $54 billion in 2000 (Arthur Jr., Bennett Jr., Edens & Bell, 2003), a 62% increase. A company's personnel can increase their level of knowledge through formal training methods as part of a global strategy, as stated by Brunello & Medio (2001). Based on tenure, different nations do, however, invest different sums in staff training. Employees worldwide receive significant financial and time investments from organizations in their training, therefore it's critical to gauge whether or not these efforts are effective in changing employees' behavior as planned.

This paper sets out on a bibliometric tour of the training effectiveness research environment. We aim to provide a thorough assessment of the state of knowledge in this topic by mapping the scholarly contributions, major authors, and emerging themes in order to pinpoint areas that want more research. This article aims to integrate the collective knowledge of scholars and researchers who have committed their efforts to enhancing our understanding of training efficacy via the lens of bibliometrics.The current study can help practitioners, researchers, and policymakers by assessing the corpus of existing knowledge, which will ultimately result in more effective training methods and better workplace results.

Methodology

Data Search

For data extraction, it is very important to choose an appropriate database. Dimensions is selected for this purpose. This selection is done because 1) researchers can search and examine grants, patents, clinical trials, policy documents, and publications using this integrated database. 2) it allows users to view the entire research lifecycle as well as investigate any one point in Comparing journals, funders, authors, and research institutions and observe linkages between researchers, publications, patents, grants, and policy documents and 3) it links data by using a machine learning technique. The present research study was selected 1962 to 2023 span of time. A total 1264 research papers were published in this period. This search string was based on Dimensions to search "Training Effectiveness", Training Impact", Training Outcome", "Training programme results", "Post Training Oragnizational performance" with full data in Commerce and Management. This search was done on 5th August 2023.The research employs bibliometric analysis, a method that is becoming more and more popular as a foundation and instrument for tracking the performance and content of research across scientific fields(Zupic& Carter, 2015). Bibliometric mapping is used to give a broad perspective of how the scientific literature is organized in a certain field(van Eck, 2011 p.1). Bibliographic networks based on citation library data on the literature records were visualized using VOSviewer. The selection of VOSviewer was based on its ability to generate an impactful summary of a scientific environment by offering heatmaps or network maps pertaining to factors like authorship, co-citations, and theme clusters. Finding the most influential writers, nations, and organizations in the field of training effectiveness information was made possible by this study.

Analysis of Countries

Local Most Productive and Most Cited Countries

Table 1 displays the local (in the data corpus), most productive (in the sense of the number of papers published), and most cited nations based on a bibliographic coupling connection analysis. Each author's institutional affiliation is mentioned in the bibliometric data, and this information establishes the author's nation affiliation. Therefore, the country affiliation refers to the nationality of the study environment, the study institution, and the community that is housing the author rather than the author's nationality.

A country was deemed to be included in the study if it has at least 25 published papers. Forty nations fulfilled the requirement. The total link strength, citation count, and number of documents were computed for each of the forty countries. The total number of documents in the chosen local data corpus is referred to as the number of documents for a given country. The total number of citations for an article that Dimensions records for that particular article is the number of counted citations for that nation. Table 1 shows the nations arranged by total bibliographic coupling link strengths in descending order.

The United States leads the pack in terms of publications (N=438) and citations (N= 21973). Australia and the United Kingdom are next in line. The United States is again the nation with the highest total connection strength (718) in co-authorship links with other nations, followed by the United Kingdom and Australia.

Table 1: Local Most Productive and Most Cited Countries

Country	Documents	Citations	Total link strength	Country	Documents	Citations	Total link strength
United states	438	21973	718	Norway	5	128	24
Australia	66	2574	244	Switzerland	10	177	24
United Kingdom	97	3067	240	Ireland	10	243	20
Netherlands	49	5038	151	Japan	13	258	17
Canada	62	2490	150	Colombia	4	14	15

Germany	45	1210	150	Ghana	8	134	15
China	51	2328	100	Israel	9	275	15
Malaysia	20	464	84	Iran	8	65	14
India	33	585	71	South Africa	6	86	12
South Korea	14	649	56	Sweden	8	136	11
Spain	22	579	53	Turkey	4	62	8
Finland	10	404	48	Poland	5	31	7
Italy	22	511	47	Indonesia	14	38	4
France	14	722	46	Nepal	3	41	4
Belgium	9	237	43	Brazil	7	78	3
Pakistan	12	132	43	United Arab Emirates	3	75	3
Taiwan	24	589	38	Saudi Arabia	5	83	2
Austria	8	213	28	Singapore	4	315	2
Portugal	5	25	28	Egypt	3	63	1
New Zealand	10	248	27	Russia	4	4	0

Analysis of Authors

Local Most Productive and Most Cited Authors

Figure 1 displays the most cited and productive (number of papers published) local (data corpus) authors based on a bibliographic coupling connection analysis. There had to be a minimum of 25 published papers per nation in order for an author to be included in the analysis. Three is the threshold for an author to have a minimum of three documents. Three citations is the minimum requirement for an author. Seventy-two authors out of 2906 met the criterion. The total number of links, citations, and documents for each of the 72 authors were computed. The total number of documents in the chosen local data corpus is the number of documents for authors. The total number of citations for an article that Dimensions records for that particular piece is the number of counted citations of authors. Descriptive findings from an analysis of all 72 items' completed templates based on the total number of bibliographic coupling citations are shown in Figure 1.Six clusters are present. The most citations in cluster 4 belong to Bakker, Arnold B., followed by Demerouti, Evangelia, and Xanthopoulou, Despoina. Six clusters are depicted in the illustration. Cluster 1 (Red) has 20 items, cluster 2 (Green) has 15 items, cluster 3 (Blue) has 14 items, cluster 4 (Yellow) has 13 items, cluster 5 (Purple) has 7 items and cluster 6 (Copper sulphate) has 3 items. Further Table 2 represent the top 10 authors with citations arranged in descending order.

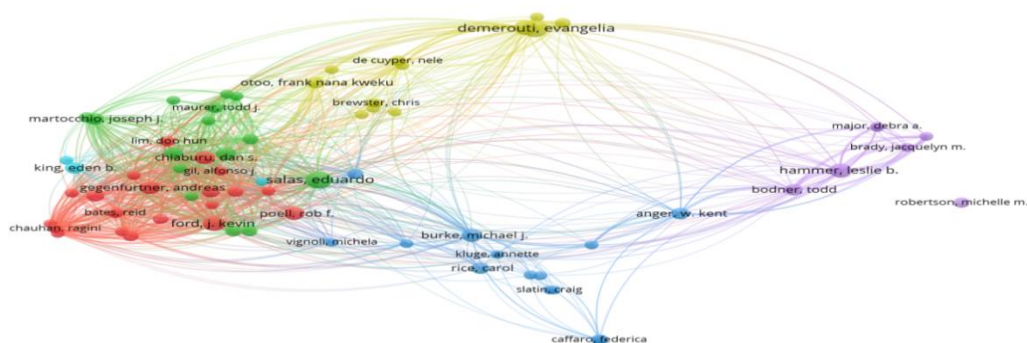*Figure 1 - Authors with citations (Network Visualization)*

Table 2 – Top 10 Authors with citations

Sl. No.	Author	Documents	Citations	Total link strength
1	bakker, arnold b.	8	2794	1527
2	demerouti, evangelia	10	2781	1530
3	xanthopoulou, despoina	4	2359	847
4	burke, michael j.	6	1575	850
5	ford, j. kevin	7	1476	3059
6	salas, eduardo	10	1317	1651
7	sitzmann, traci	4	1067	815
8	noe, raymond a.	4	1045	1182
9	tannenbaum, scotti.	6	1018	989
10	huang, jason l.	4	957	2305

Analysis of Organisation

Local Most Productive and Most Cited Organisations

Figure 2 displays the most prolific (in terms of the number of papers published) and highly referenced local (in the data corpus) organizations based on a bibliographic coupling connection analysis. The organization's density visualization, complete with papers, citations, and total link strength, is shown in Figure 2. A minimum of three citations from published works was the criterion for an organization to be included in the analysis.163 organizations fulfilled the requirement. The total connection strength, citation count, and number of documents for each of the 163 organizations were determinedThe figure for an organization's number of documents is the total number of documents in the selected local data corpus. The tallied citations for that organization are all the citations for that specific article that Dimensions records.Figure 2 shows a density representation of the organization sorted by total bibliographic coupling link strengths. According to the Density Visualization figure, the most referenced work is from Michigan State University (N = 3503), followed by Tulane University (N = 1653), University of Central Florida (N = 1396), and Tulane University (N = 1653).

*Figure 2 – Organisation with citations (Density Visualization)*
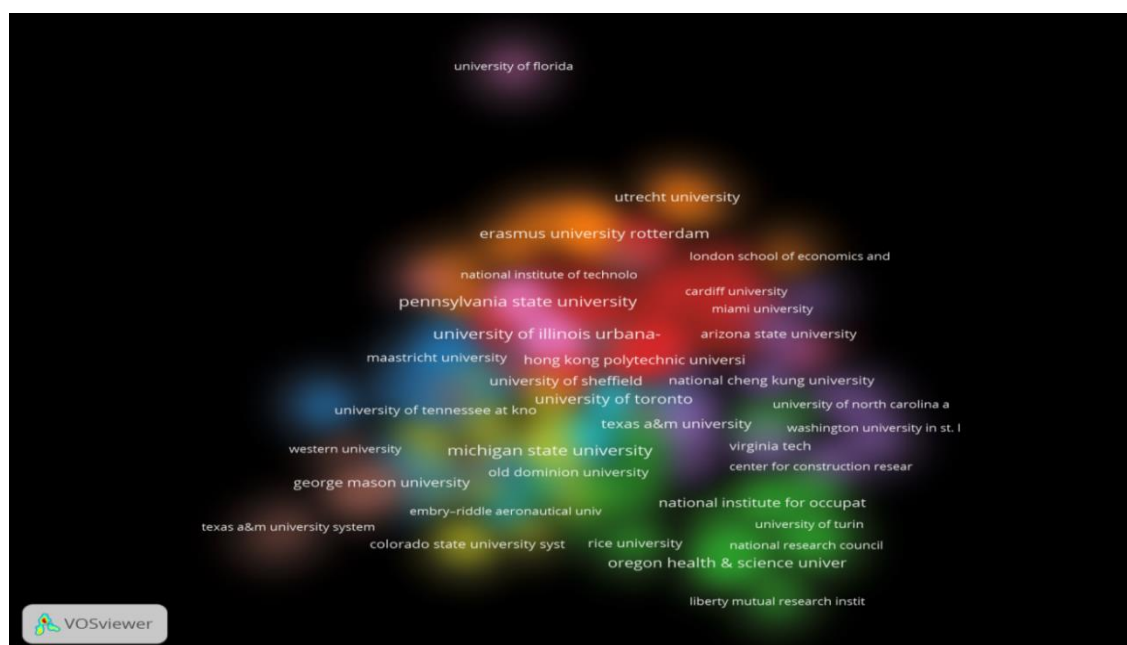
Analysis of Sources

Local Most Productive and Most Cited Sources

The total number of citations for an article that Dimensions records for that particular article is referred to as the "counted citations" of that source. In the Figure 2 overlay visualization, the Sources are arranged based on the overall bibliographic coupling link strengths. The Journal of Applied Psychology Work has received the most citations (N = 5504), followed by the Journal of Management (N = 3242) and Personnel Psychology (N = 4001). Additionally, the International Journal of Training and Development has published the most documents (N = 80), with the Human Resource Development Quarterly (N = 47) and European Journal of Training and Development (N = 50) following closely behind.
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Figure 3 – Sources with citations (Overlay Visualization)
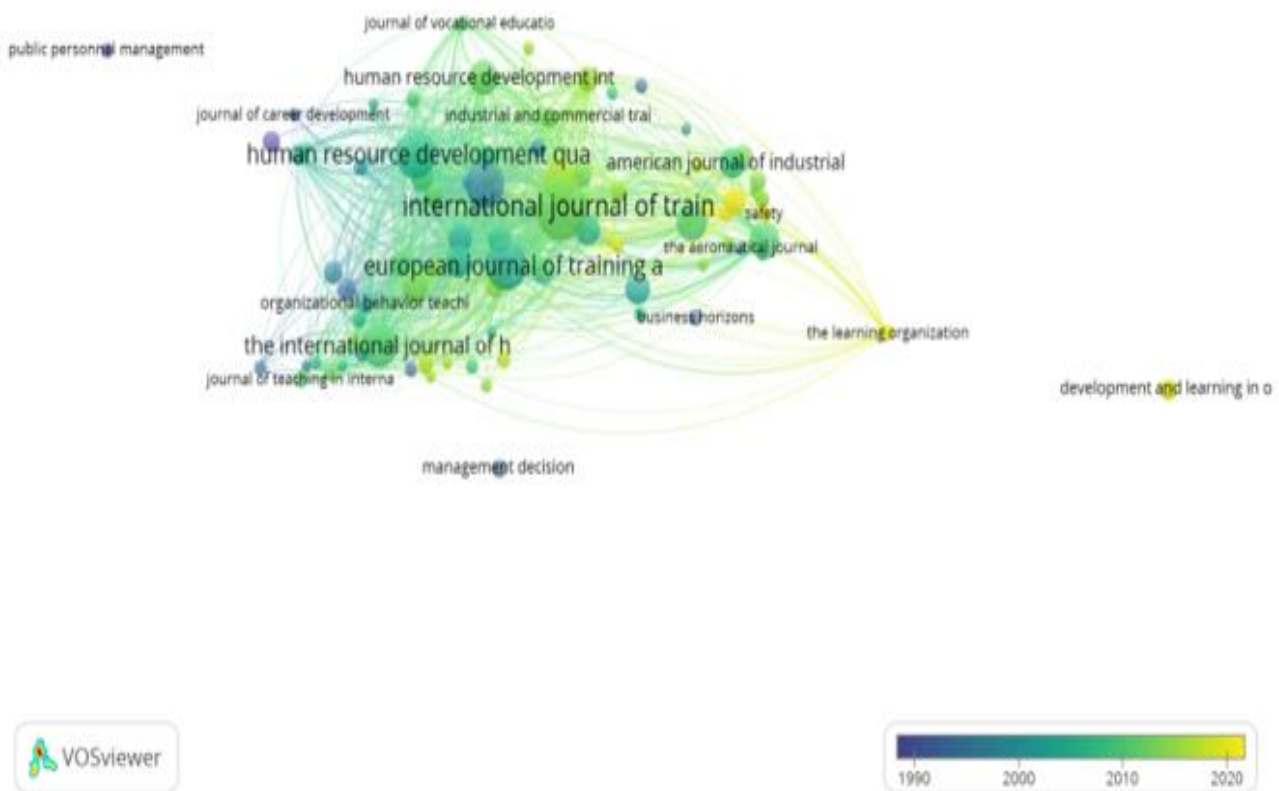
Analysis of Co-citations with authors

Based on a Co-citation link analysis with cited authors as unit of analysis, the most co-cited authors are presented in Table 3. Table 3 represents 40 Co-cited authors with citations and total link strength arranged in descending order. A source could only be included in the study if it has at least 20 citations. 557 writers out of 49314 met the requirement. The overall link strength and citations for each of the 557 authors were computed. The total number of citations in the chosen local data corpus is referred to as the "number of documents for author." The total number of citations in articles that Dimensions records is the number of citations that are tallied for a certain author. Table 3 showsThe most co-cited authors are Ford, J. Kevin, and Salas, Eduardo (N = 512), Noe, Raymond A. (N = 419), and Bakker, Arnold B. (N = 334).

Table 3 – Co-citations with authors

Sl. No.	Author	Citations	Total link strength		Sl. No.	Author	Citations	Total link strength
1	Ford, J. Kevin	512	29650		21	Gegenfurtner, Andreas	133	6154
2	Salas, Eduardo	512	24698		22	Hutchins, Holly M.	133	8119
3	Noe, Raymond A.	419	20425		23	Hammer, Leslie B.	130	6809
4	Bakker, Arnold B.	334	21431		24	Gist, Marilyn E.	127	7203
5	Baldwin, Timothy T.	315	18290		25	Podsakoff, Nathan P.	126	7401
6	Holton, Elwood F.	306	17209		26	Cannon-Bowers, Janis A.	125	5942
7	Black, J. Stewart	270	8945		27	Mackenzie, Scott B.	124	7154
8	Tannenbaum, Scott I.	264	14273		28	Zohar, Dov	124	6278
9	Schaufeli, Wilmar B.	229	14365		29	Judge, Timothy A.	123	6305
10	Demerouti, Evangelia	224	14410		30	Brown, Kenneth G.	122	6643
11	Kraiger, Kurt	220	10893		31	Lepine, Jeffrey A.	122	7493
12	Mathieu, John E.	208	11804		32	Tracey, J. Bruce	121	6809
13	Burke, Michael J.	194	9524		33	Bates, Reid	118	6987
14	Mendenhall, Mark	178	5430		34	Chiaburu, Dan S.	118	7837
15	Bandura, Albert	150	6796		35	Saks, Alan M.	115	6772
16	Burke, Lisa A.	139	8576		36	Eisenberger, Robert	113	5739
17	Bates, Reid A.	138	8325		37	Sitzmann, Traci	111	6022
18	Latham, Gary P.	138	5475		38	Chen, Gilad	110	7340
19	Podsakoff, Philip M.	138	7834		39	Dobbins,Gregory H.	110	6574
20	Colquitt, Jason A.	133	8000		40	Blume, Brian D.	109	7253

Analysis of the Publication year with corresponding number of papers published

From the data collected from Dimensions, 15 years of data i.e. from 2009 to 2023 were analyzed and found that the year the most papers were published was 2021, followed by 2020 and 2019. Table 4 clearly represents the same. Figure 4 depicts the Publication Year with corresponding no. of studies. It clearly shows that the most of the papers were published during 2021.

Table 4:ThePublicationyearwith corresponding number of papers published

Pub Year	No. of Studies		Pub Year	No. of Studies		Pub Year	No. of Studies
2023	44		2018	57		2013	40
2022	59		2017	52		2012	44
2021	86		2016	60		2011	43
2020	69		2015	40		2010	45
2019	63		2014	39		2009	35

Figure 4: Publication Year with corresponding no. of studies
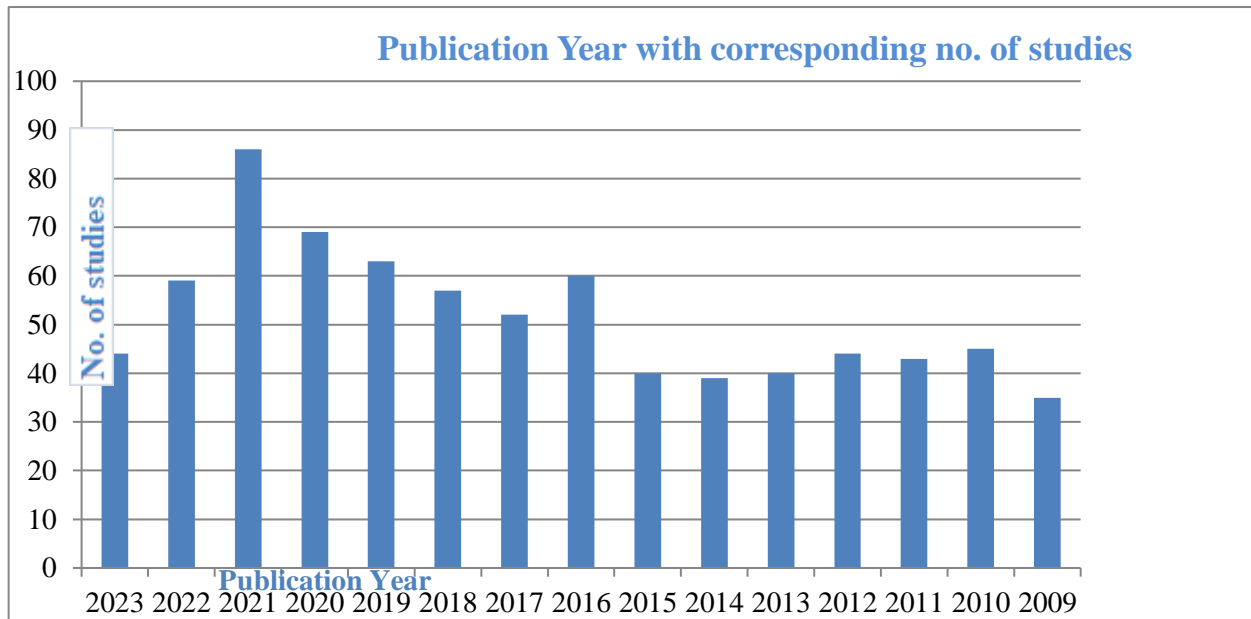
Table 5: key focus areas of top-cited authors

Sl. No.	Authors	Topic	Focus Area
1	bakker, arnold b.	Work engagement, performance, and active learning: The role of conscientiousness	Task performance, contextual performance, work engagement, and active learning
2	demerouti, evangelia xanthopoulou	Job Characteristics, Flow, and Performance: The Moderating Role of Conscientiousness	Positive experiences at work, absorption, enjoyment at work, intrinsic drive at work, and job performance
3	despoina	Regular Versus Cutback-Related Change: The Role of Employee Job Crafting in Organizational Change Contexts of Different Nature	It is not widely known how job design affects workers' work-related well-being, such as work engagement and tiredness. Worker job crafting (i.e., seeking resources, seeking difficulties, and lowering expectations) is linked to job aspects (autonomy, workload, and their interaction).
4	burke, michael j.	The Dread Factor: How Hazards and Safety Training Influence Learning and Performance	The growth of safety knowledge and safety performance is impacted by workplace dangers and safety training. Strongly captivating instruction was far more successful.

5	ford, j. kevin	Managers' perceptions of the value and impact of HAZWOPER worker health and safety training	Enhancing working conditions and adhering to regulations have a significant role in influencing managers' choices on the provision of training.
6	salas, eduardo	An Integrated Model of Training Evaluation and Effectiveness	It is not widely known how job design affects workers' work-related well-being, such as work engagement and tiredness. Worker job crafting (i.e., seeking resources, seeking difficulties, and lowering expectations) is linked to job aspects (autonomy, workload, and their interaction).
7	sitzmann, traci	Advancing training for the 21st century	Topics covered in training, training design, assessing training efficacy, and developments in training and development.
8	noe, raymond a.	Invited reaction: Development of a generalized learning transfer system inventory	Transfer of training theory & research
9	tannenbaum, scotti.	Applying Trained Skills on the Job: The Importance of the Work Environment	Workplace culture regarding the implementation of recently acquired supervisory skills, post-training behaviors, social support network, and training atmosphere and continuous learning culture
10	huang, jason l.	Transfer of Training: A Meta-Analytic Review	A few examples of predictive characteristics (e.g., trainee traits, work environment, training interventions) on the transfer of training to new activities and contexts are cognitive ability, conscientiousness, motivation, and a supportive work environment.

Discussions

Reviewing and analyzing the 1264 studies on training efficacy that were published between 1962 and 2023 was part of the study. Publication analysis reveals a generally increasing trend in the quantity of articles published, indicating a rise in interest and research effort in the topic. Even if there have been some variations in some years, the current growth generally has been quite noteworthy. This expansion is a result of the field's continuing contributions from researchers as well as the body of knowledge's constant addition. The influence and durability of the published papers are revealed in great detail by the citation metrics. According to the current data, the United States of America has the highest number of citations and documents. The most citations are in Bakker, Arnold B., and the most citations are in Journal of Applied Psychology Work. Additionally, the most co-cited authors are Ford, J. Kevin, and Salas, Eduardo, and the majority of research articles about training efficacy are published in 2021. Table 5, which identifies the primary areas of emphasis highlighted by the most cited authors, reflects the improved understanding of the topic's essential elements.

Additionally, a haphazard content analysis of the gathered research papers was done. The study conducted in a pharmaceutical sales organization by Lu and colleagues (2023) proved the short-term value of the learning-oriented assessment (LOA) approach in professional knowledge acquisition and application in relevant abilities that increase

organizational income. According to a study by Malek and colleagues (2018) on the hospitality industry, there will be less employee turnover if hotels invest in management training. This study suggests that if managers had more training, workers would have a more positive opinion of them, feel more connected to them, and be less inclined to want to leave the company.   According to research, manager training programs and employee training initiatives both have an impact on management and employee turnover. This study adds to that body of research by demonstrating that these groups are not independent and that manager development significantly influences employee turnover intentions. 137 restaurants in the Canary Islands were the subject of an empirical study carried out by Ballesteros-Rodrguez and coworkers in 2012. Results indicate that unless HRM procedures that support the training process are put in place, company culture has little bearing on the success of training programs. The study indicates, in particular, how fully HRM practices mediate between a continuous learning culture and efficient training. A study was undertaken in 2013 by Brown, Travor C., et al., taking into account 210 managers from public sector firms. Self-administered surveys and BOS from subordinates were used to evaluate transfer. Transfer was high across the board, but our experimental setup was unable to identify any beneficial impacts of being prompted to Do Your Best (DYB) on learning or behavioral end goals. The results show that managers may be able to facilitate transfer by giving them a Better Off Score (BOS) that outlines the primary skills covered in the training program, asking them to set goals or encourage them to use these skills as much as possible at work, and having coworkers use these BOS to evaluate their performance at work.

From the standpoint of self-perception, the study by Ling, Ling, and colleagues (2014) examines and validates the applicability of Western training and employability scales in China. the favorable relationship between organizational commitment and employability that results from training. Furthermore, employability mediates the relationship between training and organizational commitment, whereas expectancy value moderates the association between the two. Ricci et al. (2021) state that the program is effective and could reduce the degree to which linguistic and cultural differences affect how risk is perceived in the construction industry.Computer-based training, according to Laharnar et al. (2013), is a useful method for raising supervisors' knowledge and awareness to promote policy implementation. The Ryan-Kossek model is supported by the fact that supervisors often lack the training and knowledge necessary to apply policies effectively, which can have detrimental effects on both the employer and the employee. The outcomes further show that long-term workers require further training on complicated workplace regulations like FMLA. Diego-Mas (2020) and et al. talked about how their research revealed that adopting immersive media boosts trainee engagement. Similar to this, learning materials are seen as more fascinating and practical and are better retained over time, increasing workers' awareness of the hazards associated with ergonomics. They found that very little of the training had really been implemented in the workplace three months after the event. Research conducted in 2013 by Ford and colleagues suggests that teaching flight attendants in Crew Resource Management is a helpful strategy for encouraging cooperative behavior between the flight attendant and pilot sub-groups. One especially useful strategy for breaking down communication barriers between the two groupings is joint training sessions, in which pilots and flight attendants work together to find solutions to emergency situations that may develop while in flight.

The findings of Liu and Yang's (2018) investigation revealed that the examined workers' PARs (Personal Attenuation Ratings) varied widely. The fit testing and one-on-one instruction enhanced PAR and lessened the harm brought on by the usage of protective hair covers.Repeating fit tests may prove valuable in confirming the attenuation received over the course of an earmuff's useful life because they are frequently worn for extended periods of time (>1 year). The study done by Glass and et al. (2016) offers proof in favor of interactive, computer-based training that is conducted on-site for increased workplace safety. The workplace training successfully enhanced knowledge and improved the environment at work. The research by Alfred et al. (2018) showed that simulated environments can produce proficiency on par with or better than physical surroundings. These findings have significance for simulated environment design and implementation, particularly for online course delivery.

Hermawati and colleagues (2014) performed research in the automotive industry and came to the conclusion that there was a compelling argument to be made for the adoption of virtual training for assembly-related tasks. But it was also made clear that stakeholders would rather use virtual training to supplement pre-series car training than to replace it. Research by Chapagain and colleagues (2018) in a bank shown that employees perform better at work the more effective their training is. In order to better the context and method of training from the viewpoint of the employees, more emphasis is needed. The study came to the additional conclusion that training efficacy and job performance are influenced by the workplace environment.

In a study on the health industry conducted by Tamsah and colleagues in 2023, it was found that training effectiveness (TE) increased soft skill competency (SSC) and health worker performance (HWP), but had no direct impact on boosting employees' capacity (EC). The requirement for SSC to mediate the interaction between these two variables was thus

emphasized. Additionally mediating TE's impact on HWP were SSC and ECIt was anticipated that these findings will add to the scant literature explaining the connection between HWP and human resources (HR) planning, particularly in light of the COVID-19 pandemic.Agrawal et al. (2016) conducted research on the auto-ancillary industry using the Kirkpatrick model of training evaluation, which covers reaction, learning, behavior, and result as its four major components. The result demonstrates that training efficacy is significantly impacted by the identification of training needs. The variables reactivity, learning, behavior, results, and training effectiveness all exhibit a positive, statistically significant association. The effectiveness of training is also significantly influenced by age, experience, and other factors, but qualification has little to no impact. The demographic factors, such as age, experience, and education, are found to have a considerable impact on the common element, learning when undergoing training.

Conclusion

This article provides an overview of the state of the science regarding training efficacy and includes a bibliographic analysis that highlights important works as well as historical and contemporary research trends. A considerable amount of content analysis was carried out by choosing at random the articles that Dimension had gathered. It is possible to achieve both short- and long-term training benefits, according to studies reviewed in this study. It is evident that the focus of published studies on American authors has allowed for a deeper exploration of the subject while also highlighting potential avenues for future research through collaboration between nations.This kind of collaborative effort could improve the outcomes and provide fresh angles that are hardly explored in a single, narrowly limited geographic area. This major body of work has been successful in explaining the positive correlation between performance and human resources training when it is examined from various perspectives, such as the universalistic or contingency theories. In spite of this, we discovered that there remains ample space for further advancement in alternative methodologies, such as ethics or stakeholders, which are comparatively underrepresented in the process of developing research on the subject. It has also been noted that the majority of study publications have focused on industries such as banking, pharmaceuticals, automobiles, construction, healthcare, and aviation; little research has been done on training and how effective it is measured in the power industry.

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