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DIGITAL TRANSFORMATION AND RESILIENCE IN TEACHER EDUCATION: A BIBLIOMETRIC ANALYSIS



Abstract

Although the COVID-19 pandemic is no longer an ongoing global emergency, its impact on teacher education systems worldwide has led to long-term structural and pedagogical transformations. In the post-pandemic era, teacher education research has shifted from emergency remote teaching toward sustainable digital transformation, resilience, and innovation in pedagogical practices. Therefore, analyzing the evolution of research trends during and after the pandemic period provides valuable insights into how global teacher education systems adapt to educational disruptions and long-term digital change.

The study identifies key publication trends, highly cited works, prolific authors, influential institutions, and collaborative networks. We utilized the Bibliometrix package in RStudio and Biblioshiny web applications to analyze 2,185 peer-reviewed studies. The analysis covered publication and citation patterns, top-cited documents, authorship productivity, country-wise contributions, institutional influence, and journal impact. Collaborative networks among countries and co-citations were also visualized using Three-Fields plots and Trend Topics analysis. The findings identified *Sustainability* and the *International Journal of Environmental Research and Public Health* as the most influential publication sources. The University of California and Monash University emerged as leading research institutions. *Daniel (2020)* was the most cited paper with 868 citations, while Yang X and Liu H were the most productive authors. The USA, China, and Spain led in research output. This bibliometric analysis provides a comprehensive understanding of the evolving landscape of teacher education research in the post-pandemic era. The insights gained offer valuable implications for policymakers, educators, and researchers, guiding future advancements in teacher education.

Keywords: teacher education, during and post COVID-19, pandemic, bibliometrics analysis, research.

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МҰҒАЛІМДЕРДІ ДАЯРЛАУДАҒЫ ЦИФРЛЫҚ ТРАНСФОРМАЦИЯ ЖӘНЕ ТҰРАҚТЫЛЫҚ: БИБЛИОМЕТРИЯЛЫҚ ТАЛДАУ

Аңдатпа

COVID-19 пандемиясы енді жаһандық төтенше жағдай ретінде қарастырылмаса да, оның бүкіл әлемдегі мұғалімдерді даярлау жүйелеріне ықпалы ұзақ мерзімді құрылымдық және педагогикалық өзгерістерге алып келді. Пандемиядан кейінгі кезеңде педагогикалық білім беру саласындағы зерттеулер жедел қашықтан оқытудан тұрақты цифрлық трансформацияға, орнықтылыққа және педагогикалық тәжірибедегі инновацияларға бағытталды. Сондықтан пандемия кезеңіндегі және одан кейінгі зерттеу үрдістерінің эволюциясын талдау жаһандық мұғалімдерді даярлау жүйелерінің білім беру үдерісіндегі дағдарыстар мен ұзақ мерзімді цифрлық өзгерістерге қалай бейімделетінін түсінуге құнды мүмкіндік береді. Зерттеу аясында негізгі жарияланым үрдістері, ең көп дәйектелген еңбектер, өнімділігі жоғары авторлар, ықпалды ғылыми мекемелер және зерттеу саласындағы ынтымақтастық желілері анықталды. Талдау үшін біз RStudio-дағы Bibliometrix пакетін және Biblioshiny веб-қосымшасын пайдаланып, 2 185 рецензияланған зерттеуді зерттедік. Талдау барысында жарияланымдар мен дәйексөз алу үлгілері, ең көп дәйектелген мақалалар, авторлық өнімділік, елдер бойынша үлестер, мекемелердің ықпалы және журналдардың беделі қарастырылды. Сондай-ақ, елдер арасындағы ынтымақтастық желілері мен қосымша дәйексөз алу үрдістері Three-Fields plots және Trend Topics талдауы арқылы визуализацияланды. Нәтижелер бойынша Sustainability және International Journal of Environmental Research and Public Health ең ықпалды ғылыми басылымдар ретінде анықталды. Калифорния университеті мен Монэш университеті жетекші зерттеу мекемелері ретінде ерекшеленді. Дэниел (2020) ең көп дәйектелген мақала болды (868 дәйексөз), ал ең өнімді авторлар Ян Х. және Лю Х. деп танылды. Зерттеу көлемі бойынша АҚШ, Қытай және Испания көш бастады. Бұл библиометриялық талдау пандемиядан кейінгі кезеңдегі мұғалімдерді даярлау зерттеулерінің даму динамикасын жан-жақты сипаттайды. Алынған нәтижелер саясаткерлер, педагогтер және зерттеушілер үшін құнды ақпарат беріп, мұғалімдерді даярлау саласындағы болашақ жетістіктерге жол ашады.

Түйін сөздер: мұғалімдерді даярлау, COVID-19 кезінде және одан кейін, пандемия, библиометриялық талдау, зерттеу.

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ЦИФРОВАЯ ТРАНСФОРМАЦИЯ И УСТОЙЧИВОСТЬ В ПЕДАГОГИЧЕСКОМ ОБРАЗОВАНИИ: БИБЛИОМЕТРИЧЕСКИЙ АНАЛИЗ

Аннотация

Хотя пандемия COVID-19 больше не рассматривается как глобальная чрезвычайная ситуация, её влияние на системы подготовки учителей во всем мире привело к долгосрочным структурным и педагогическим трансформациям. В постпандемийный период исследования в области педагогического образования сместили фокус с экстренного дистанционного обучения на устойчивую цифровую трансформацию, развитие резильентности и инновации в педагогической практике. Таким образом, анализ эволюции научных тенденций в период пандемии и после неё позволяет получить ценные сведения о том, как глобальные системы подготовки учителей адаптируются к образовательным кризисам и долгосрочным цифровым изменениям. В исследовании выявляются основные тенденции публикаций, наиболее цитируемые работы, продуктивные авторы, влиятельные научные учреждения и

сети сотрудничества. Для анализа 2 185 рецензируемых исследований мы использовали пакет Bibliometrix в RStudio и веб-приложение Biblioshiny. Анализ охватывал модели публикаций и цитирования, наиболее цитируемые документы, продуктивность авторов, вклад стран, влияние научных учреждений и значимость журналов. Кроме того, сети сотрудничества между странами и совместное цитирование были визуализированы с помощью Three-Fields plots и анализа Trend Topics. Результаты показали, что наиболее влиятельными источниками публикаций являются журналы Sustainability и International Journal of Environmental Research and Public Health. Калифорнийский университет и Университет Монаша были определены как ведущие исследовательские учреждения. Работа Daniel (2020) оказалась самой цитируемой (868 цитирований), а самыми продуктивными авторами стали Yang X и Liu H. По объему научных публикаций лидировали США, Китай и Испания. Этот библиометрический анализ предоставляет всесторонний обзор развития исследований в области подготовки учителей в постпандемический период. Полученные данные представляют ценную информацию для политиков, педагогов и исследователей, направляя дальнейшее развитие подготовки учителей.

Ключевые слова: подготовка учителей, во время и после COVID-19, пандемия, библиометрический анализ, исследование.

Introduction. Although the COVID-19 pandemic is no longer an ongoing global emergency, its impact on teacher education systems worldwide has led to long-term structural and pedagogical transformations. The pandemic acted as a catalyst for accelerated digitalization, hybrid learning models, and the redefinition of professional competencies required for future teachers.

In the post-pandemic era, teacher education research has shifted from emergency remote teaching toward sustainable digital transformation, resilience, and innovation in pedagogical practices. Therefore, analyzing the evolution of research trends during and after the pandemic period provides valuable insights into how global teacher education systems adapt to educational disruptions and long-term digital change.

There are literature studies on the teacher's emotional exhaustion, expertise, needs, and wellbeing in in-service teacher education, online PBL for teacher education during pandemic [1], lessons learned through crisis [2] and blended Learning as a Negotiation Space in Teacher Education [3] during and post the COVID-19 pandemic times and other research studied on teacher education in and beyond the pandemic. Crises such as global pandemics, natural disasters, or political instability can seriously disrupt conventional educational processes and force educational institutions to turn to alternative teaching methods [4]. Some current studies reveal that teachers still struggle with ICT implementation in the classroom and the transition to digital distance learning, which was exacerbated by Covid-19 [5].

Several studies reported that the integration of technology in teacher education and digital transformation is not just a choice but a necessity in the post-COVID-19 educational landscape [6-8]. The COVID-19 pandemic has caused a significant shift to online/blended teaching and learning that educators tried to incorporate new technologies in their classrooms [9] [10, 11].

Consequently, e-learning has evolved from a supplementary tool for face-to-face instruction to an indispensable reality [12]. New active teaching methodologies have emerged in education due to digital resources. The pandemic has made it necessary to adopt online teaching methods [13].

During the pandemic, special attention was paid to digital literacy, teachers' digital competencies, and e-learning [4]. Digital literacy is a set of knowledge, skills, and behaviors related to the use of digital devices and a set of human abilities to find, evaluate, analyze, create, and transfer information in digital formats. Digital devices include desktop computers, laptops, tablets, smartphones, and similar devices. Teachers' digital competencies represent teachers' digital literacy, ensuring the thoughtful, safe, and flexible improvement of the process of traditional, online, and hybrid teaching [14]. However, no bibliometric study and scientific mapping examining the evolution of research trends during and after the pandemic period providing valuable insights into how global teacher education systems adapt to educational disruptions and long-term digital change. Bibliometric methods of assessment are used by researchers to determine the impact of a single author or to define the link between two or more authors or works. Another approach in evaluative bibliometrics is science mapping, which aims to highlight structural and dynamic characteristics of scientific research [15]. Bibliometric analyses enable readers to gain a holistic view of the chosen topic of research throughout a specified time period [16].

A bibliometric analysis on teacher education during and beyond the COVID-19 pandemic is crucial for staying informed, identifying research trends, and making data-driven decisions that can ultimately enhance the quality of teacher education and, by extension, the learning experiences of students. Therefore, this study aimed to conduct scientific mapping and bibliometric analysis related to the studies on the teacher education during and post COVID-19 pandemic. The following research questions guided the study:

1. Which are the most relevant and cited studies, authors, affiliations, and sources relating to teacher education during and post COVID-19?
2. What are the trend topics in teacher education during and post COVID-19?
3. What are co-occurrence, co-citation, and countries' collaboration?

Materials and Methods. This study uses a bibliometric analysis, which is a term that was coined by Pritchard (1969) [17] who stated that it can be applied in all studies that aim to quantify the process of written communication [16]. Bibliographic review, also called science mapping, seeks to examine all published studies in a field through analyzing bibliographic data on a large scale in order to understand the structural and relationship features of the literature [18-20]. To find relevant studies, we used the Scopus database.

2.1. Data Sources

The selection of the Scopus database was motivated by its comprehensive coverage of top-tier journals in the field of education, rendering it a prime source for robust bibliometric analysis [12]. Scopus serves as a repository of interdisciplinary global scientific knowledge, encompassing domains such as science, technology, medicine, social sciences, and the arts and humanities [13]. Within the Scopus database, we conducted keyword searches, targeting Abstract title, Abstract, and Keywords, using the terms "Teacher and education and during and post and covid-19 and pandemic." Initially, 3,062 papers were retrieved. After meticulous screening to adhere to eligibility criteria, which involved excluding 877 ineligible studies (comprising book chapters, reviews, conference papers, book conference reviews, and articles not in English), 2,185 papers were retained for inclusion in this bibliometric analysis. The search was executed on September 25, 2023, and a detailed depiction of the entire search strategy is presented in Figure 1.

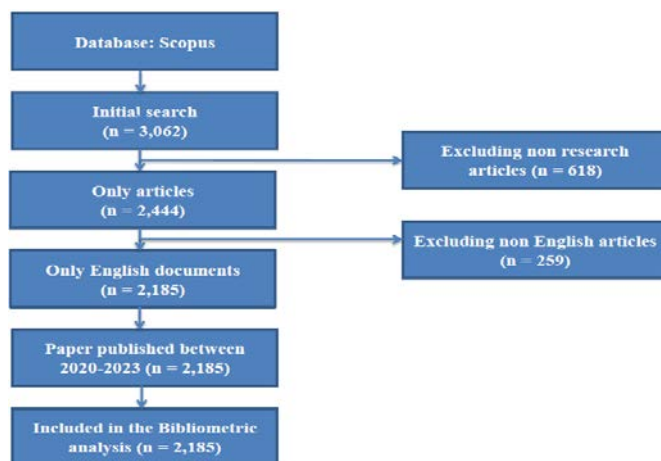


Figure 1. Flow diagram of study selection for the bibliometric analysis on teacher education in and beyond the Covid-19

2.2. Data Analysis

The current bibliometric investigation was executed using the BiblioShiny app within the R Statistical Package (version 4.3.1), which is renowned for its comprehensive capabilities in conducting

intricate bibliometric analyses. Subsequently, the Scopus dataset was imported into the BiblioShiny interface in BibTeX format.

Bibliometric analysis encompasses two primary dimensions. The first facet encompasses descriptive and performance assessments. This phase involves aggregating general data about sources and document types, along with the statistical compilation of annual and cumulative studies and citations. Moreover, a roster of the top 10 most cited studies is presented. Lastly, the most prolific authors, sources, institutions, and countries are identified.

The second dimension centers on scientific mapping and network analyses. It entails scrutinizing document coupling to discern thematic clusters, primarily through authors' keywords. The study further unveils thematic maps within the realm of teacher education during and post the COVID-19 pandemic. Additionally, the analysis delves into networks for co-occurrences, co-citations, and international collaborations, employing a network-oriented approach.

Results. Among the studies included in the analysis, a significant portion comprised original articles (71.3%), while non-research and articles not in English accounted for the remaining 28.7%. The average number of citations per document and per document per year stood at 11.64 and 2.8, respectively. Notably, articles on this topic typically took an average of 8.9 years to garner citations. Spain emerged as the most frequently cited country (11%), closely followed by the USA and India, both at 10%. Table 1 provides details on the top 10 most cited documents in this field, with seven of them originating from original research. Our analysis covered 2,185 studies, involving 8,199 authors representing 100 countries. On average, each author contributed to 0.3 documents, with an average of 3.7 authors per document. It's noteworthy that only 11% of the publications were single-authored. The majority of the articles were distributed across research fields, with the highest percentages in COVID-19 (8%), followed by human and education (6%), and pandemic and humans (5%).

Trend of Publication and Citation. Throughout the duration of the COVID-19 pandemic and its aftermath, a notable and consistent increase in publications related to teacher education research has been evident. This upward trend was most pronounced in 2022, with 759 publications, while the lowest point was observed in 2020, with 209 publications (see Figure 2A). In contrast, the annual average citation rate has exhibited a gradual and somewhat irregular decline. Specifically, the mean citation rate reached its zenith in 2020 at 13.7, and its nadir in 2023 at 0.8 (refer to Figure 2B).

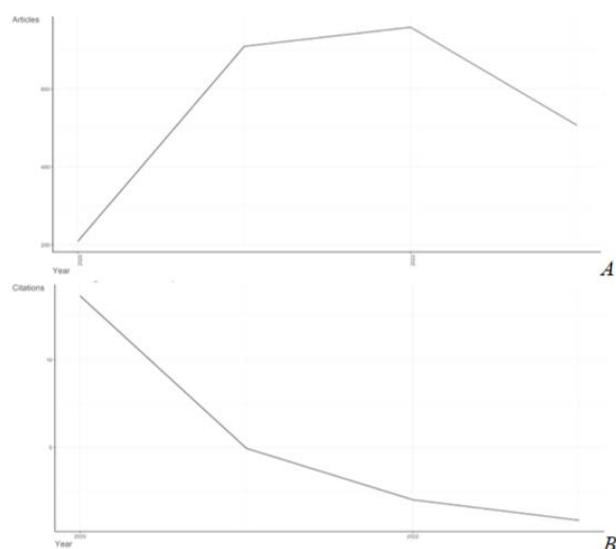


Figure 2. Global annual trend of (A) publication and (B) citation of teacher education research during and post times of COVID-19

Table 1. The top 10 most cited documents on Teacher Education During and Post the COVID-19 Pandemic

Rank	Study ID [ref]	Title of the Document	Document Type	Journal Name	TC	DOI
1	Daniel, 2020 [10]	Education and the COVID-19 pandemic	Research article	PROSPECTS	868	10.1007/s11125-020-09464-3
2	Mishra, 2020 [27]	Online teaching-learning in higher education during lockdown period of COVID-19 pandemic	Research article	International Journal of Educational Research Open	810	10.1016/j.ijedro.2020.100012
3	Mukhtar, 2020 [17]	Advantages, Limitations and Recommendations for online learning during COVID-19 pandemic era	Research article	Pakistan Journal of Medical Sciences	537	10.12669/pjms.36.COVID19-S4.2785
4	Konig, 2020 [44]	Adapting to online teaching during COVID-19 school closure: teacher education and teacher competence effects among early career teachers in Germany	Research article	European Journal of Teacher Education	531	10.1080/02619768.2020.1809650
5	Carrillo, 2020 [117]	COVID-19 and teacher education: a literature review of online teaching and learning practices	Research article	European Journal of Teacher Education	429	10.1080/02619768.2020.1821184
6	Dong, 2020 [59]	Young children's online learning during COVID-19 pandemic: Chinese parents' beliefs and attitudes	Research article	Children and Youth Services Review	308	10.1016/j.childyouth.2020.105440
7	Sintema, 2020 [10]	Effect of COVID-19 on the Performance of Grade 12 Students: Implications for STEM Education	Research article	Eurasia Journal of Mathematics, Science and Technology Education	259	10.29333/EJMSTE/7893
8	Baker, 2020 [28]	Estimating the burden of United States workers exposed to infection or disease: A key factor in containing risk of COVID-19 infection	Research article	Plos one	242	10.1371/journal.pone.0232452
9	Assuncao, 2020 [24]	Teacher education in times of COVID-19 pandemic in Portugal: national, institutional and pedagogical responses	Research article	Journal of Education for Teaching	239	10.1080/02607476.2020.1799709
10	Kim, 2020 [57]	'Like a rug had been pulled from under you': The impact of COVID-19 on teachers in England during the first six weeks of the UK lockdown	Research article	British Journal of Educational Psychology	234	10.1111/bjep.12381

Contributing Universities and Their Collaboration Network. The University of California emerged as the top-performing institution, contributing 14% of the global output in teacher education research during and after the pandemic (see Figure 3A). Following closely, Monash University made a significant impact, accounting for 12% of the research output. Utilizing the leading eigenvalues clustering algorithm, we identified the most influential collaborative networks among institutions. The top five networks were formed by (i) Monash University, (ii) Near East University, and Beijing Normal University, (iii) Nanjing Normal University, (iv) University of Dhaka, and (v) King Saud University (see Figure 3B).

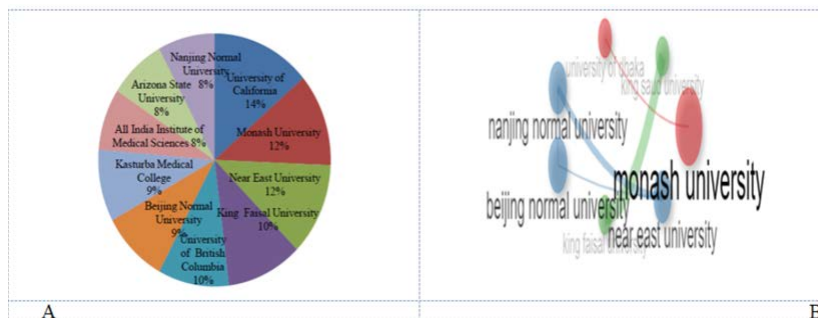


Figure 3. (A) Ten most contributing universities and (B) leading five collaboration networks among universities on teacher education research during and post COVID-19 times

Most Contributing Authors and Their Collaboration Networks. In the context of teacher education research during and after COVID-19, the most prolific authors in terms of the number of published documents were (i) Yang X (n = 8), (ii) Liu H (n = 7), Liu Q (n = 7), and (iii) Kumar A (n = 6) (see Figure 4A). Examining the co-citation network (see Figure 4B) and applying the 'Leading Eigenvalues' clustering, with a focus on high 'Betweenness' scores, we identified the most co-cited authors, who were (i) Yang X, (ii) Liu H, and (iii) Liu Q.

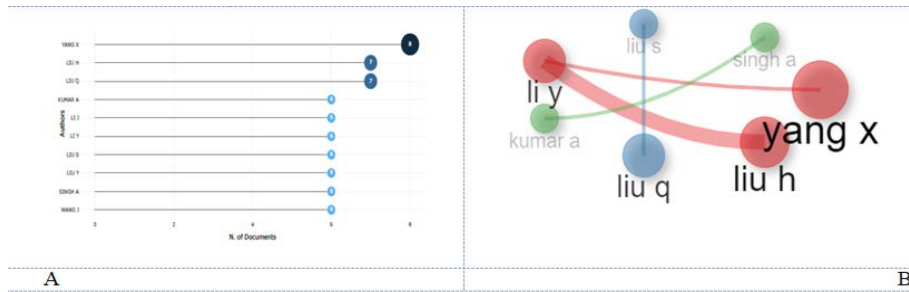


Figure 4. (A) Most contributing ten authors and (B) co-citation network of authors working on Teacher education during and post COVID-19 times

Most Productive Journals. Approximately 7.1% of the total published papers in our field were featured in the journal 'Sustainability,' followed by 'International Journal of Environmental Research and Public Health' (4.7%) and 'Education Sciences' (4.2%) (refer to Table 2). Notably, the journal 'Heliyon' occupied the 10th position, with a contribution of 0.8% of papers on this subject. What's intriguing is that all the top ten journals publishing articles on teacher education research during and post COVID-19 were not associated with high impact factors, as per the 2022 JCR®, WoS. Instead, they were exclusively categorized in the Q1/Q2 range, reflecting a noteworthy trend.

Table 2. Top ten journals publishing papers on Teacher education during and post COVID-19 times

Rank	Journal name	Country	Number of Papers Published on the Topic (%), n = 2185	h-Index	Total Citations	JCR® 2020 Impact Factor	JCR® 2020 Category (Quartile)
1	Sustainability	Switzerland	157 (7.1%)	23	1960	3.9	Environmental Sciences Q2 Environmental Studies Q2
2	International Journal of Environmental Research and Public Health	Switzerland	103 (4.7%)	19	1353	4.6	Environmental Sciences Q2 Public, Environmental & Occupational Health Q2
3	Education Sciences	Switzerland	68 (3.1%)	14	623	3.0	Education & Educational Research Q1
4	Frontiers in Education	Switzerland	44 (2%)	10	337	2,3	Education & Educational Research Q2
5	BMC Medical Education	England	37 (1.7%)	8	314	3.6	Education & Educational Research Q1 Education, Scientific Disciplines Q2
6	Frontiers in Psychology	Switzerland	37 (1.7%)	13	788	3.8	Psychology, Multidisciplinary Q1
7	PLOS ONE	USA	34 (1.5%)	12	638	3.7	Multidisciplinary Sciences Q2
8	Education and Information Technologies	USA	23 (1%)	11	349	5.5	Education & Educational Research Q1
9	Journal of Education for Teaching	England	20 (0.9%)	14	1204	4.0	Education & Educational Research Q1
10	Heliyon	England	19 (0.8%)	9	239	4.0	Multidisciplinary Sciences Q2

Discussion. Bibliometric analysis is a scientific computer-assisted review methodology that can identify core research or authors, as well as their relationship, by covering all the publications related to a given topic or field [21]. Bibliometric analysis can explore the impact of any research field, the impact of a set of researchers, the impact of a particular paper, or help to identify particularly impactful papers understanding the overall intellectual landscape within a specific field of research [22, 23].

In our bibliometric analysis on teacher education research during and post COVID-19 pandemic (2020–2023), we observed that the number of articles was high in 2021 and 2022 years than 2020 and 2023 years. It means that authors studied teacher education during the COVID-19 but not post COVID-19 pandemic times. Research article titled “Education and the COVID-19 pandemic” by Daniel, 2020 was the first among the top ten most cited documents on this topic. The mean citation has been decreasing slowly which is most likely due to the fact that older publications are cited more than newly published papers from the same year. Our findings indicate that 70% of the contributing countries on this topic are Europe countries with the USA being at the top of the list. USA spends more on teacher education research during and post COVID-19 pandemic than other countries as well as among Asian countries; China, India and Indonesia are at the top ten list of productivity on teacher education research during and post COVID-19 pandemic times. During and post the COVID-19 pandemic, the University of California emerged as the most productive institution, contributing to approximately 14% of the global output in the field of teacher education research. Following closely behind, Monash University accounted for a substantial 12% of the research output. This highlights the substantial contributions of these universities to the field, both during the pandemic and in its aftermath. Furthermore, utilizing the leading eigenvalues clustering algorithm, we identified major collaborative networks among institutions. These collaborative networks offer insights into the global landscape of teacher education research. The identification of these collaborative networks sheds light on the global nature of teacher education research. It reflects the willingness of universities to work together across borders, sharing expertise and knowledge to address the challenges posed by the pandemic and to advance the field of teacher education. This collaborative spirit is crucial for the development and improvement of teacher education programs, which in turn, has a direct impact on the quality of education and the preparation of educators for the future. In addition, 50% of journals publishing papers on teacher education research during and post COVID-19 pandemic times are from Switzerland. In conclusion, the landscape of teacher education research has witnessed significant fluctuations in publication and citation trends during and post the COVID-19 pandemic. While publication output experienced a remarkable surge in 2022, citations per article demonstrated a somewhat irregular pattern. The prominence of keywords such as “COVID-19,” “education,” and “human” further reflects the central role of digitalization and global transformation processes in shaping contemporary research trends. Understanding these dynamics is critical for educators and researchers as they navigate the challenges and opportunities of digital transformation, ultimately contributing to the resilience and effectiveness of education systems in a rapidly evolving world.

Conclusion. In our comprehensive bibliometric analysis of teacher education research during and post the COVID-19 pandemic (2020–2023), several key findings emerged. The substantial increase in the number of articles in 2021 and 2022, compared to 2020 and 2023, reveals a strong focus on teacher education during the pandemic itself, rather than its aftermath. The research article "Education and the COVID-19 pandemic" by Daniel (2020) played a pivotal role, emerging as the most cited document, showcasing the field's collective interest in addressing the pandemic's educational challenges. The gradual decrease in mean citations can be attributed to the inherent preference for citing older publications. This underscores the relevance of keeping research up-to-date and accessible. Europe, with the USA at the forefront, contributed significantly to this research. This regional concentration underscores the global implications of the pandemic on teacher education. Notably, the University of California and Monash University played vital roles, contributing to 14% and 12% of the global research output, respectively. Their significant contributions reflect their dedication to advancing the

field. Major collaborative networks, identified through eigenvalues clustering, highlight the global nature of teacher education research. These networks demonstrate the willingness of institutions to work across borders, sharing knowledge and expertise to address pandemic challenges. A significant portion of journals publishing research in this area were based in Switzerland.

In conclusion, the landscape of teacher education research has undergone notable fluctuations during and post the COVID-19 pandemic. The global COVID-19 crisis may have a long-lasting influence upon education worldwide, calling for institutional efforts to provide prompt technical support and sufficient learning resources to develop teachers' technology literacy for their future online and offline teaching [24]. Also, the landscape of teacher education research has experienced significant transformation during and following the COVID-19 pandemic. While the pandemic initially triggered emergency responses in educational systems, it subsequently accelerated long-term digital transformation and strengthened the focus on resilience within teacher education. The global crisis highlighted the necessity of institutional support, sustainable technological infrastructure, and the development of teachers' digital competencies for both online and blended learning environments.

The bibliometric findings demonstrate a clear shift from short-term emergency remote teaching toward broader themes such as digital innovation, resilience, sustainability, and systemic adaptability. The prominence of keywords related not only to COVID-19 but also to digitalization, teacher competencies, and educational reform indicates that the pandemic functioned as a catalyst for deeper structural and pedagogical changes.

Understanding these evolving research trends is crucial for policymakers, educators, and researchers seeking to enhance the resilience, adaptability, and long-term effectiveness of teacher education systems in an era characterized by continuous technological advancement and global uncertainty.

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СТУДЕНТТЕРДІҢ ОҚУ МОТИВАЦИЯСЫН ДАМЫТУДАҒЫ ЖАСАНДЫ ИНТЕЛЛЕКТ ӘЛЕУЕТІ ЖӘНЕ ЗАМАНАУИ ЗЕРТТЕУЛЕРДІ ТАЛДАУ

Аңдатпа

Мақалада жоғары оқу орындарына жасанды интеллект құралдарын енгізу мәселесі және студенттердің оқу мотивациясына ықпалы қарастырылады. Цифрлық жаңғыру академиялық кеңістіктің мазмұнын өзгеше пайымдауға, дәстүрлі оқыту тәсілдерін заманауи интеллектуалды жүйелермен ұштастыруға жол ашып отыр. Аталмыш бағытта жасанды интеллект білім алушының жеке ерекшеліктерін ескеретін, тапсырманы бейімдейтін, жедел кері байланыс беретін әрі пәнге қызығушылықты күшейтетін пәрменді құрал ретінде айрықша маңызға ие.

Зерттеудің мақсаты – студенттердің оқу мотивациясын қалыптастырудағы жасанды интеллекттің педагогикалық әлеуетін ашу және оны жоғары мектеп тәжірибесінде қолдану мүмкіндіктерін бағалау. Осынау мақсатта отандық және шетелдік ғылыми еңбектер сараланып, интеллектуалды жүйелердің академиялық ортадағы қызметі, қолданылу аясы, студент белсенділігіне әсер ететін тетіктері талданып қарастырылды. Ғылыми деректерді зерделеу студентті дайын мәліметті қабылдаушы деңгейінде қалдырмай, дербес ізденіске жетелейтінін, нәтижені саналы бағалауға және пән мазмұнымен терең байланыс орнатуға әсер ететінін дәлелдеді.

Зерттеу нәтижелері жасанды интеллект мүмкіндіктерін жоғары білім кеңістігінде ұтымды әрі жауапты қолдану қажеттігін айқындайды. Жұмыста ұсынылған түйінді тұжырымдар педагогикалық мәнін нақтылауға, оқу тәжірибесіндегі орнын байыпты бағалауға және кейінгі ғылыми ізденістерге бағыт беруге негіз қалайды.

Түйін сөздер: жасанды интеллект, оқу мотивациясы, жоғары білім беру, цифрландыру үдерісі, инновациялық оқыту.