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Bibliometric analysis of research trends in curriculum development dased on the Covid-19 pandemic

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Abstract

The COVID-19 pandemic has driven significant changes in curriculum development, mainly through the accelerated integration of digital technologies, the contextualisation of core content with pandemic-related themes, and the adoption of flexible teaching methodologies. This study aims to analyse research trends in curriculum development influenced by the pandemic using a bibliometric approach based on Scopus data (2020–2024). The findings reveal increased research interest in immediate responses, such as online learning platforms and digital literacy training during 2020–2021, followed by long-term adaptations, including sustainable curriculum frameworks and inclusive stakeholder involvement. The study also identifies gaps in long-term digital integration strategies and variability in stakeholder engagement. These findings highlight the importance of flexibility, collaboration, and innovative technologies in building resilient and adaptive education systems. This research contributes to the theoretical discourse on adaptive curriculum design and offers practical insights for more inclusive and responsive educational policies and practices in addressing future crises.

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INTRODUCTION

Curriculum development plays a pivotal role in shaping educational experiences by aligning course content, learning outcomes, and instructional strategies with the changing needs of society and learners. Zaidi (2014) defines the curriculum as a planned academic activity encompassing learning objectives, educational content, and the environment in which education occurs. Effective curriculum design necessitates carefully synchronising these elements to achieve educational goals (Bhat, 2017). Moreover, the implementation process requires thorough evaluation and management to ensure that the curriculum remains adequate and relevant in achieving its intended outcomes (Callahan, 2021). In higher education, curriculum development defines program structures and equips students with essential skills and knowledge for future careers (Rahayu *et al*., 2019). It also reflects the responsiveness of educational institutions to societal demands, technological advancements, and evolving global challenges.

The Covid-19 pandemic, which began in December 2019, catalysed significant disruptions across societal sectors, with education experiencing some of the most profound impacts. As the virus spread globally, educational institutions were compelled to transition from traditional in-person instruction to remote and online formats to ensure continuity in learning (Photopoulos *et al*., 2021a). This abrupt shift exposed critical limitations in existing educational frameworks, particularly in curriculum design and delivery. Traditional curricula often lacked the tools necessary to support extended remote instruction and address the diverse technological needs of students and educators. The absence of sufficient technological integration and preparation for prolonged digital instruction exacerbated these challenges, necessitating immediate curricular adjustments (Aggarwal & Singla, 2021).

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The pandemic underscored the importance of curriculum adaptability to sustain educational continuity and quality during crises. Curriculum flexibility is crucial for content delivery, maintaining student engagement, and achieving intended educational outcomes, as highlighted by Alexandre and Carrilho (2023) and Buttigieg and Sapiano (2021). In response, the processes of curriculum design and development underwent substantial re-evaluation. New strategies and digital tools were integrated to support remote and hybrid learning environments. These adaptations emphasised the need for a dynamic and responsive curricular framework to address immediate educational challenges while accommodating the long-term demands of a rapidly evolving global landscape.

Amid these shifts, there has been a surge in research exploring curriculum adaptation during the pandemic. Emerging trends reflect a growing focus on competency-based curricula, digital tools, and innovative teaching methods aimed at addressing the unique challenges posed by the pandemic. However, despite this growing body of literature, a significant gap persists in understanding specific trends, themes, and emerging research areas that address the pandemic's impact on curriculum development. While some research has explored the digitalisation of curricula in the context of broader technological advancements (Brown Wilson & Slade, 2020), fewer studies have specifically examined how the pandemic has influenced curriculum trends and priorities comprehensively.

The sudden and widespread transition to online and hybrid learning environments presented unprecedented challenges for curriculum designers. Digital literacy, flexible teaching methodologies, and advanced technologies became essential curriculum components to ensure effective learning in a remote setting. Research by Aggarwal and Singla (2021) underscores the centrality of online learning platforms during the pandemic while pointing to significant gaps in curricular frameworks, including inadequate technological integration and a lack of preparedness for prolonged periods of digital instruction. These findings reveal the urgent need for comprehensive frameworks supporting educators and learners in navigating these challenges.

This study aims to address the aforementioned gaps by conducting a bibliometric analysis of research trends in curriculum development since the onset of the pandemic. Drawing on data from the Scopus database, this study seeks to map key themes, identify influential journals, and uncover emerging topics in curriculum research. By analysing publications from 2020 to 2024, the research provides a comprehensive overview of how the pandemic has reshaped the field of curriculum development. The analysis emphasises the growing importance of adaptability, technological integration, and stakeholder collaboration in shaping resilient curricula for crises.

The novelty of this study lies in its focus on curriculum development within the specific context of the Covid-19 pandemic. Unlike prior bibliometric analyses concentrating on curriculum digitalisation in the broader digital era, this research examines how the pandemic has influenced curriculum priorities, methods, and research directions. As supported by Ninkov *et al*. (2021) and Nundy *et al*. (2022), bibliometric analysis offers quantitative insights into publication patterns, citation trends, and the relationships among scholarly works. This methodological approach enables a comprehensive understanding of the shifts in curriculum development research since the pandemic. By mapping current trends, this study highlights the role of curriculum development in fostering resilient, adaptable, and sustainable educational systems, both during and beyond the pandemic.

The findings from this research aim to contribute valuable insights into the evolving role of curricula in addressing contemporary educational challenges. As curriculum development is an ongoing, iterative process (Bhat, 2017; Dvořák, 2023), the pandemic has added a layer of urgency to its adaptation. It necessitates revisions to content and a fundamental reconsideration of the methodologies and technologies employed in delivery. This study aspires to inform future practices and policymaking in creating educational systems that are better equipped to withstand global disruptions by addressing gaps in understanding how the pandemic has reshaped curriculum research and priorities.

METHOD

This study employs a bibliometric analysis to systematically explore research trends in curriculum development influenced by the COVID-19 pandemic. A structured methodology was designed to ensure thorough data collection, analysis, and reporting, with the research following the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to enhance methodological rigour and transparency. Previous studies have shown the effectiveness of bibliometric analysis in capturing academic responses to the pandemic across various fields, such as higher education and online learning (Zhang *et al*., 2022), educational strategies and psychological impacts (Alshahrani, 2022), and emergency curriculum development in physics education (Deta *et al*., 2023).

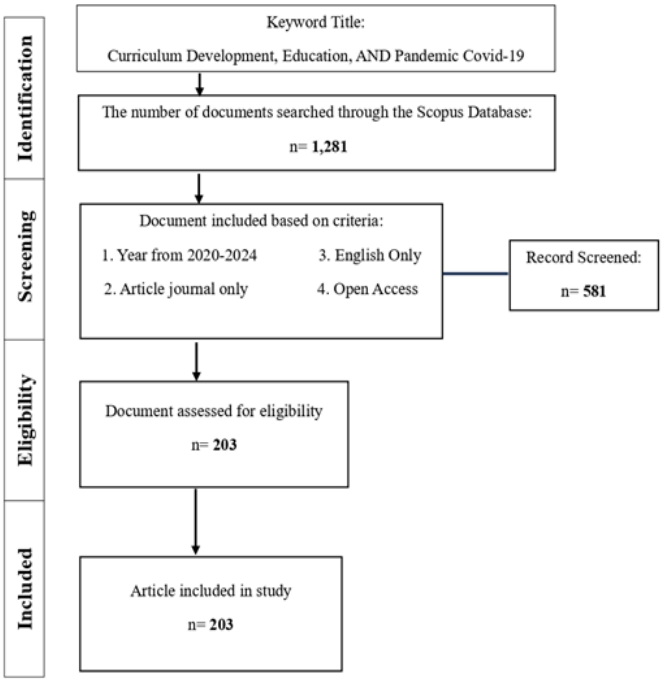


Figure 1 Research methods - PRISMA

The Scopus database was selected for data sources due to its extensive indexing of peer-reviewed academic journals and multidisciplinary scope, essential for capturing comprehensive insights into curriculum-related research (Aristovnik *et al*., 2020). Using the keywords "curriculum development," "education," and "Covid-19 pandemic," the search was tailored to identify studies that focus on curriculum adjustments and innovations prompted by the pandemic. This keyword combination ensured relevance, capturing studies that address the role of curriculum design in responding to educational disruptions (Sagita & Prahmana, 2022).

To refine the dataset, inclusion and exclusion criteria were established. Articles were included if published between 2020 and 2024 in English and classified as peer-reviewed journal articles. Open-access articles were prioritised to allow unrestricted access to full texts. In terms of exclusion, conference papers, book chapters, and non-peer-reviewed documents were omitted to maintain a focus on high-quality academic research. A citation threshold was also applied, excluding articles with fewer than seven citations to concentrate on impactful studies likely to influence the field (Usman & Ho, 2021).

The data collection and screening process followed four stages of PRISMA guidelines. Initially, the search yielded 1,281 articles, filtered according to the inclusion and exclusion criteria. The screening step narrowed down the selection to relevant, high-quality publications. During the eligibility check, a manual review confirmed that all retained articles met the citation threshold. This process resulted in 203 articles selected for the final analysis.

Key data points were extracted from each article, including authorship, publication year, journal, subject area, and keywords, which helped identify the main themes and research focuses. VOSviewer software was utilised for data visualisation, creating co-authorship networks, keyword co-occurrences, and thematic clusters (Zhang *et al.*, 2022). VOSviewer's capabilities in mapping relationships across the dataset enabled the study to uncover patterns and emerging research areas (Deta *et al.*, 2023).

The data were analysed across several dimensions: publication trends, top journals and subject areas, influential authors, and thematic clusters. Publication trends were tracked annually to observe shifts in research interest over time. Identifying the leading journals and subject areas provided insight into which disciplines were most engaged in curriculum research related to Covid-19. The analysis also mapped co-authorship networks, revealing prominent contributors and collaborative efforts in the field. Finally, thematic clustering through keyword analysis helped to determine the primary research themes and emerging topics in curriculum development amid the pandemic (Alshahrani, 2022; Usman & Ho, 2021).

This systematic approach provides a detailed view of curriculum research as it has adapted to the unique challenges posed by Covid-19, offering valuable insights into trends, collaboration, and evolving educational priorities.

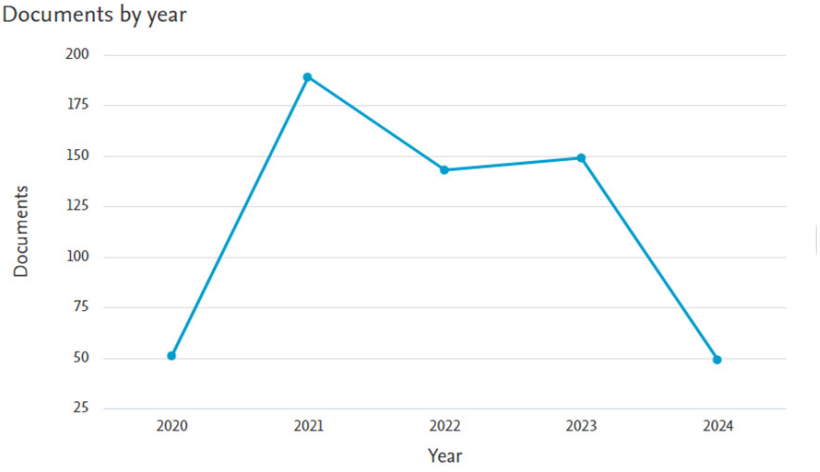
RESULT AND DISCUSSION

The results of curriculum development research four years after the onset of the Covid-19 pandemic, i.e., from 2020 to 2024, are presented in a graph on the Scopus website. Additionally, VOSviewer visualised and analysed bibliometric data, illustrating the relationships between keywords, topics, and authors in scientific publications.

A. Number of published documents per year

Figure 2 illustrates the number of documents published from 2020 to 2024 and depicts the trends in academic output related to a specific field, likely influenced by the Covid-19 pandemic. Initially, there was a sharp increase in publications from 2020 to 2021, reflecting the urgent academic and practical need to address the immediate impacts of the pandemic on various sectors, possibly including public health, education, and social sciences. This surge indicates a rapid mobilisation within the research community to understand and mitigate the effects of the pandemic

Figure 2 Number of published documents per year on Scopus



Following this peak, there is a noticeable decrease from 2021 to 2022. This may suggest that the initial rush to publish findings and share knowledge had plateaued as the most urgent

questions were addressed and the global situation stabilised. From 2022 to 2023, the number of publications shows a slight increase, possibly indicating a second wave of research focused on the longer-term impacts of the pandemic, evaluating the effectiveness of earlier interventions, or exploring emerging issues as the world adjusted to the new normal.

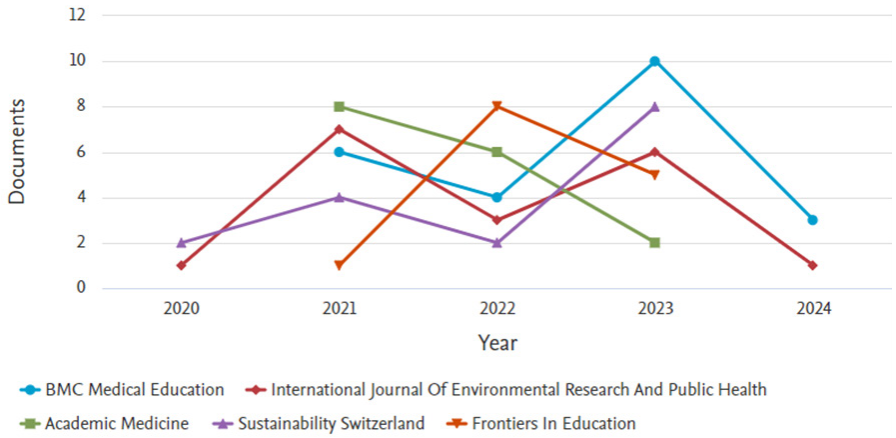
However, the significant publication drop from 2023 to 2024 is particularly striking. This decline could indicate that the field is experiencing a saturation point, where the immediate research needs and questions about the pandemic have been mainly addressed, or it could suggest a shift in focus towards other emerging global issues. Alternatively, this drop could reflect a return to pre-pandemic research norms and publication rates as the acute phase of the pandemic's impact wanes.

These trends offer crucial insights for future research directions and for understanding the lifecycle of academic interest in crisis-related phenomena. They also highlight the importance of sustained research funding and interest in exploring the long-term consequences of global disruptions like the Covid-19 pandemic, ensuring that lessons learned are integrated into future preparedness plans and policies.

B. Journals most aligned with the research theme

Figure 3 illustrates the distribution of journal articles highlighting the research focus areas in response to the Covid-19 pandemic's impact on curriculum development. BMC Medical Education leads with 23 articles, underscoring its pivotal role in disseminating research aimed explicitly at adapting medical education to meet the challenges posed by the pandemic. This concentration strongly emphasises practical and immediate applications to enhance medical training and education during health crises.

Figure 3 Most aligned with the tesearch theme

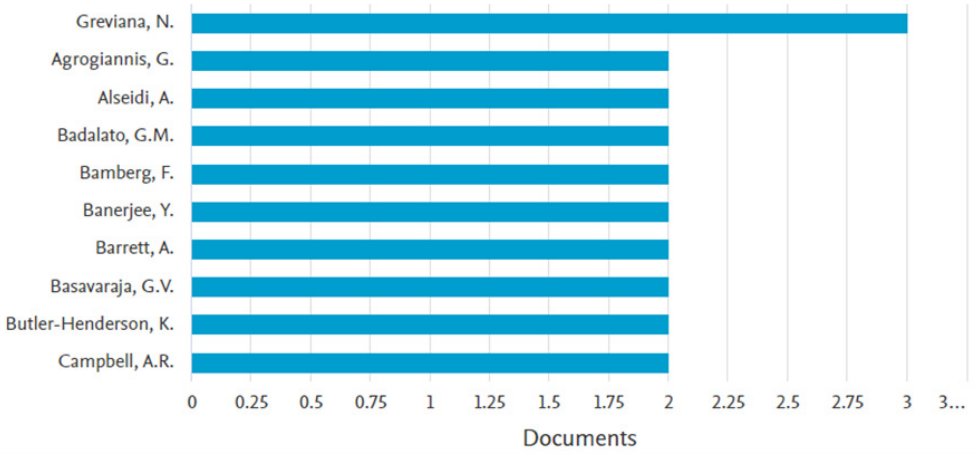


The International Journal of Environmental Research and Public Health and Sustainability Switzerland follows closely, with 18 and 16 articles, respectively. These journals focus on the intersections of public health, environmental sustainability, and education, reflecting a broader approach to curriculum development that incorporates public health imperatives and sustainable practices. Academic Medicine also features 16 articles, emphasising the medical education community's focus on integrating pandemic-related changes. Frontiers in Education rounds out the list, indicating a consistent interest in innovative educational strategies across various disciplines. Together, these journals reveal a diverse yet focused academic response to curriculum development under the pressures of global health challenges, offering insights into specific and interdisciplinary education approaches during the pandemic.

C. Authors with the most contributions

Figure 4 showcases the contributions of ten authors to curriculum development during the Covid-19 pandemic and offers a revealing glimpse into the dynamics of academic output in this vital area. The leading position of Greviana indicates not only a high volume of contributions but potentially pivotal research that could be shaping the discourse around educational responses to the pandemic. As the most prolific author, Greviana's work likely serves as a cornerstone for understanding how curricula can be effectively adapted in crisis conditions, suggesting a focus on innovative, resilient educational strategies that others in the field might be building upon.

Figure 4 Authors with the most contributions



Greviana, followed by Agrogiannis and Alsedi, contribute progressively fewer documents. However, their significant involvement points to a robust engagement with diverse aspects of pandemic-driven curriculum changes. Their research explored specific innovations in online education delivery, adjustments in medical education, and responses to sudden shifts in educational policy, reflecting a broad yet intense investigation into how different educational sectors cope with unprecedented disruptions.

D. Subject Areas Related to the Theme

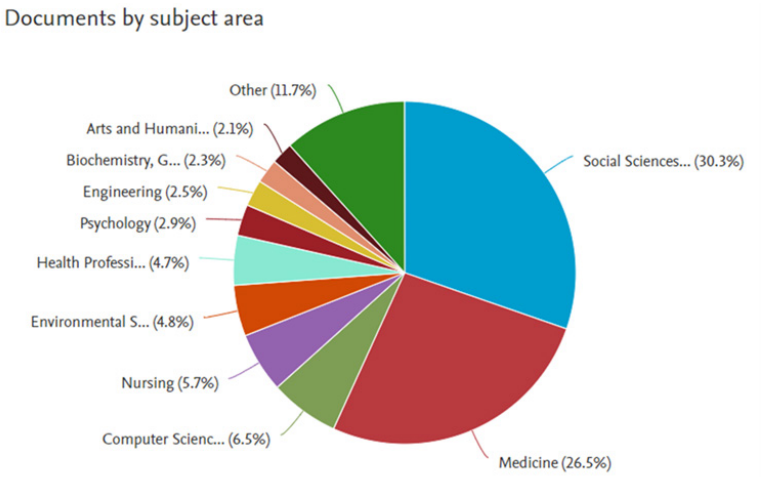
Figure 5 (pie chart) elucidates the distribution of academic documents across various subject areas, illustrating a diverse range of research emphases in response to a context, presumably the COVID-19 pandemic, based on prior data. The analysis reveals that social sciences dominate, constituting 30.3% of the documented research. This predominance in social sciences highlights a comprehensive interdisciplinary inquiry into the societal repercussions of Covid-19, spanning policy analysis, economic impacts, social behaviour changes, and educational adaptations necessitated by the pandemic. This significant proportion indicates the critical need to understand the broader social dynamics and policy responses to health crises, underscoring the importance of social research in managing public health emergencies.

Additionally, Medicine accounts for 26.5% of the research, reflecting the direct response to the health challenges posed by the pandemic, including clinical research, vaccine development, treatment protocols, and public health strategies. Other notable fields include nursing and health professions, representing over 10% of the research, emphasising practical healthcare applications and frontline responses. The 6.5% allocation to computer science underscores the growing reliance on technology for data analytics, modelling the pandemic's spread, and developing telehealth services.

In this regard, environmental science and engineering, representing smaller but significant segments, likely focus on the environmental impacts of the pandemic and engineering solutions

for medical equipment and facility safety. This distribution suggests a robust multidisciplinary approach to pandemic research, indicating potential areas for future interdisciplinary collaboration and a pressing need for comprehensive strategies that integrate medical, social, technological, and environmental perspectives to address global health crises effectively.

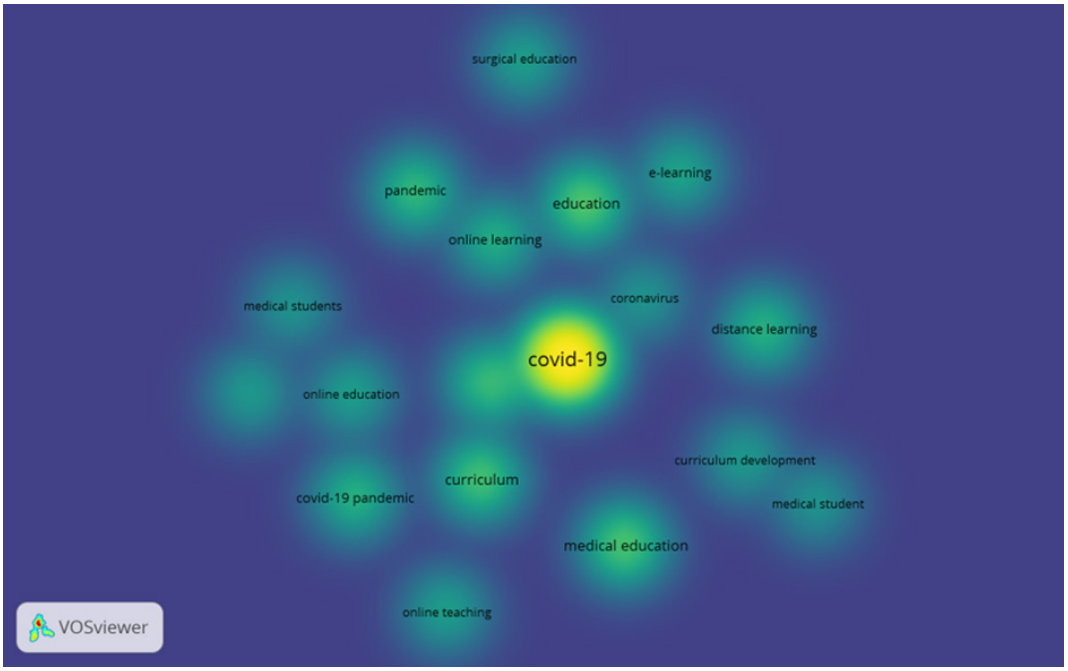
Figure 5 Subject areas related to the theme



E. Potential topics based on theme

The bibliometric visualisation (Figure 6) generated by VOSviewer provides a detailed mapping of the research landscape on curriculum development influenced by the Covid-19 pandemic. The varying intensities of the colour gradient within the visualisation signify the relative frequency and depth of research across different topics. Notably, the most brightly coloured area, labelled "Covid-19," marks a substantial concentration of research efforts, underscoring the pandemic's dominant role as a subject within educational research. This region indicates a broad range of studies focused on immediate responses to the pandemic. These include shifts to online education, challenges in maintaining educational quality, and the rapid adaptation of curricula to support remote learning environments.

Figure 6 Potential topics based on theme



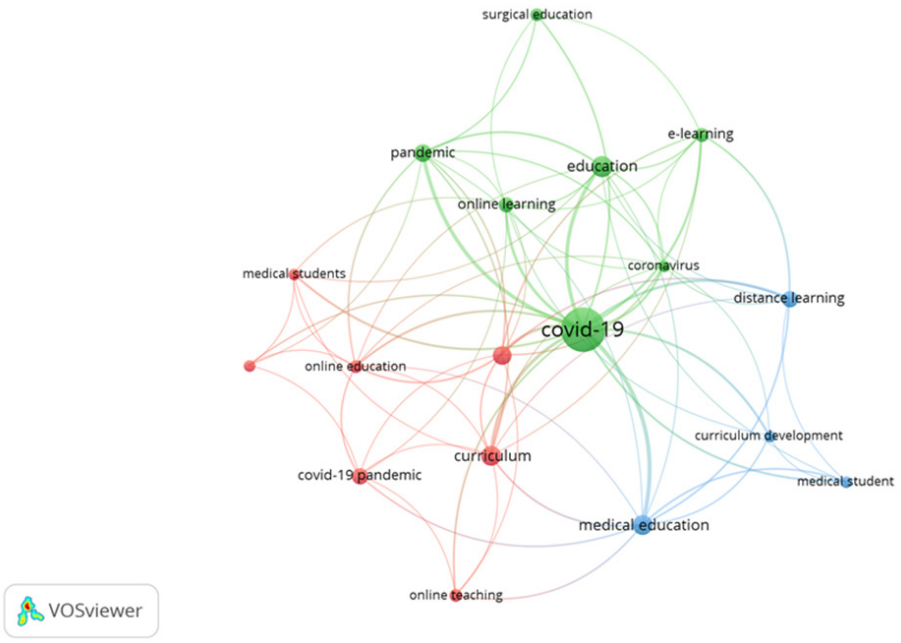
Adjacent to this, the areas marked by bright colours but less intense than "Covid-19"—specifically "education," "pandemic," and "medical education"—reflect significant yet slightly less concentrated research activity. These areas highlight widespread concern regarding how educational systems globally have adapted to pandemic-induced disruptions, focusing on the adjustments within medical training programs. These are critical due to the direct implications for healthcare professionals during the health crisis.

F. Main topics based on theme (cluster)

The bibliometric analysis identified three clusters, each marked by different colours, offering insights into the primary research focus areas within the educational community during the Covid-19 pandemic.

Cluster Green includes seven terms: "Covid-19," "coronavirus," "e-learning," "education," "online learning," and "pandemic." The prevalence of these terms underscores a significant shift towards online learning, reflecting the rapid adoption of e-learning platforms necessitated by the pandemic. This cluster likely investigates online learning systems' effectiveness, challenges, and educational outcomes, which have become crucial during this period.

Figure 7 Main topics based on theme



Cluster Red contains five terms: "curriculum," "online teaching," "Covid-19 pandemic," "online education," and "medical students." This cluster focuses on how educational curricula have adapted to online formats and the particular effects on fields such as medical education. Including "medical students" suggests research targeting how the pandemic has uniquely impacted the training of future healthcare professionals, highlighting the need for pedagogical adjustments and curriculum reforms to meet new educational demands.

Cluster Blue consists of four terms: "distance learning," "curriculum development," "medical student," and "medical education." This cluster explores broader educational system adjustments beyond immediate responses to the pandemic. It likely addresses long-term strategies for curriculum development and the role of distance learning as a normalised component of education, with a special emphasis on medical education.

Overall, these clusters reveal how the research community has responded to the educational challenges posed by the pandemic, highlighting a shift towards integrating technology in learning and the necessity for flexible curriculum design to accommodate unforeseen circumstances.

G. Discussion

This study highlights the transformative effects of the Covid-19 pandemic on curriculum development, particularly in accelerating the integration of digital tools, contextualising core content with pandemic-related themes, and adopting flexible teaching methodologies. The findings align to understand how curriculum development adapted to the educational disruptions caused by the pandemic. These changes reflect an increasing emphasis on competency-based and technology-driven education, demonstrating the need for curricula that ensure learning continuity during crises. The analysis reveals a surge in research interest during 2020–2021, focusing on immediate responses such as adopting online learning platforms and digital literacy training (Photopoulos *et al*., 2021b). Subsequent trends highlight longer-term adaptations, including sustainable curriculum frameworks and the inclusive involvement of stakeholders in curriculum development (Brown Wilson & Slade, 2020).

The findings align with Roberts (2021), who emphasised that contextualising biological concepts within pandemic scenarios maintains relevance without compromising core curricula. These challenges resonate with the study's findings on integrating digital tools and ensuring quality teaching to mitigate disruptions. The emphasis on Education for Sustainable Development (ESD) aligns with da Rocha *et al*. (2021), who highlighted the importance of equipping learners with resilience through ESD-focused curricula. However, this study extends the existing literature by revealing gaps in long-term digital integration strategies and stakeholder engagement variability, suggesting a broader framework is needed to support educators and learners in navigating crisis-driven educational landscapes.

The adaptations observed in this study directly respond to the urgent need to address educational disruptions caused by the pandemic, mainly through the rapid shift to online learning. Studies such as Onyishi and Sefotho (2023) emphasised the pivotal role of technology in curriculum delivery, which is corroborated by these findings. However, disparities in technological access and digital literacy among educators and students significantly influenced the effectiveness of these adaptations. The integration of ESD reflects a broader trend toward building resilience through education, as suggested by Gersmehl and Gersmehl (2022), who viewed curriculum adjustments as "mental vaccines," preparing learners to navigate crises with critical thinking skills. These insights underscore a paradigm shift in curriculum development, emphasising adaptability and sustainability.

The findings of this study contribute to the theoretical discourse on adaptive curriculum design by emphasising flexibility and responsiveness as core principles (Daud *et al*., 2024). Integrating stakeholder collaboration and technological innovation into curriculum frameworks is essential for addressing global educational challenges. Practically, this research offers actionable insights, such as the importance of incorporating pandemic-related themes to enhance engagement, expanding digital literacy programs to improve the effectiveness of technology-driven learning, and promoting equitable access to resources to bridge disparities in education. Additionally, fostering collaboration among policymakers, educators, and stakeholders is critical for ensuring the successful implementation of curriculum reforms and creating resilient and inclusive education systems capable of adapting to future crises (Kehinde, 2023).

While this study provides valuable insights, it is not without limitations. Though effective for identifying trends, reliance on bibliometric methods does not provide qualitative insights into the pedagogical outcomes of curriculum adaptations. Furthermore, the dataset is limited to peer-reviewed articles in English, potentially excluding relevant research in other languages or

formats. Variations in citation practices across disciplines may also influence the representativeness of the findings. Contextual factors, such as socioeconomic disparities and regional differences, were not explicitly examined, limiting the study's ability to address the localised impacts of the pandemic on curriculum development. Future research addressing these limitations could offer a more comprehensive understanding of the pandemic's influence on education.

Building on the findings, future research should adopt mixed methods approaches to explore the qualitative dimensions of curriculum adaptations, particularly their impact on student outcomes and teacher efficacy. Longitudinal research is necessary to assess the sustainability of digital tools and collaborative practices in curriculum design. Comparative studies across regions or educational systems could illuminate contextual factors influencing the success of curriculum reforms. Government-initiated curriculum reforms, such as Indonesia's Merdeka Belajar initiative (Sihombing *et al*., 2021), provide valuable case studies for examining effective policy frameworks for educational resilience. Further exploration of how these reforms align with global trends in curriculum development can contribute to more inclusive and adaptable education systems.

In conclusion, the findings of this study emphasise the critical role of curriculum development in navigating the educational disruptions caused by the Covid-19 pandemic. Integrating digital technologies, fostering stakeholder collaboration, and addressing diverse learner needs are crucial in creating resilient and adaptive education systems. These insights contribute to the broader discourse on educational resilience, providing a foundation for future research and policy development. As the world faces complex global challenges, curriculum development remains a cornerstone in building inclusive, sustainable, and future-ready education systems.

CONCLUSION

This study reveals that the Covid-19 pandemic has significantly influenced curriculum development, accelerating the adoption of digital tools, emphasising competency-based learning, and integrating pandemic-related themes into core content. These changes highlight a shift toward adaptive and technology-driven education to ensure learning continuity during crises. The findings emphasise the importance of stakeholder collaboration and sustainable curriculum frameworks, reflecting a growing focus on resilience and inclusivity in educational systems. Significantly, the research identifies gaps in long-term digital integration and stakeholder engagement strategies, proposing a need for broader frameworks to address disparities in technological access and digital literacy. The integration of Education for Sustainable Development (ESD) emerges as a pivotal element for equipping learners with resilience and critical thinking skills.

This study advances the discourse on adaptive curriculum design by emphasising flexibility, sustainability, and responsiveness while offering practical insights for enhancing digital literacy, equitable resource access, and stakeholder collaboration. However, its reliance on bibliometric methods and English-language articles limits localised and qualitative perspectives. Future research should adopt mixed methods to explore qualitative curriculum adaptations, assess the sustainability of digital tools, and analyse regional responses to educational disruptions. Additionally, case studies and longitudinal analyses can inform effective policies for building resilient and inclusive education systems, underscoring the transformative potential of curriculum development in addressing global educational challenges.

REFERENCES

Aggarwal, P., & Singla, A. (2021). A survey to ascertain the impact of COVID-19 on the education and health of students. *2021 Sixth International Conference on Image Information Processing (ICIIP)*, 505–510. https://doi.org/10.1109/ICIIP53038.2021.9702539

Alexandre, L. S., & Carrilho, E. (2023). Post-COVID-19 Metabolomics: Pursuing the Sequels of a Pandemic. In F. N. Crespilho (Ed.), *Covid-19 Metabolomics and Diagnosis* (pp. 95–111). Springer Nature

Switzerland. https://doi.org/10.1007/978-3-031-27922-5_6

Alshahrani, A. F. M. (2022). Psychological and educational learning strategies and models during the Covid-19 pandemic: A comparative bibliometric analysis. *Frontiers in Psychology*, *13*, 1029812. https://doi.org/10.3389/fpsyg.2022.1029812

Aristovnik, A., Ravšelj, D., & Umek, L. (2020). A Bibliometric Analysis of Covid-19 across Science and Social Science Research Landscape. *Social Sciences*. https://doi.org/10.20944/preprints202006.0299.v2

Bhat, D. (2017). Study of Faculty Viewpoints on Challenges and Factors Influencing Curriculum Development/Revision. *Journal of Clinical and Diagnostic Research*. https://doi.org/10.7860/JCDR/2017/25697.10764

Brown Wilson, C., & Slade, C. (2020). From consultation and collaboration to consensus: Introducing an alternative model of curriculum development. *International Journal for Academic Development*, *25*(2), 189–194. https://doi.org/10.1080/1360144X.2019.1584897

Buttigieg, C. P., & Sapiano, G. (2021). The Covid-19 Pandemic: A Regulatory Perspective. In G. Barrett, J.-P. Rageade, D. Wallis, & H. Weil (Eds.), *The Future of Legal Europe: Will We Trust in It? : Liber Amicorum in Honour of Wolfgang Heusel* (pp. 81–96). Springer International Publishing. https://doi.org/10.1007/978-3-030-68253-8_4

Callahan, C. M. (2021). Curriculum Implementation, Management, and Assessment. In K. R. Stephens & F. A. Karnes, *Introduction to Curriculum Design in Gifted Education* (1st ed., pp. 223–240). Routledge. https://doi.org/10.4324/9781003235842-14

Da Rocha, V. T., Fritzen, B., & Brandli, L. L. (2021). Covid-19 and Education for Sustainable Development Role: An Assessment of Latin American Schools. In W. Leal Filho (Ed.), *COVID-19: Paving the Way for a More Sustainable World* (pp. 389–409). Springer International Publishing. https://doi.org/10.1007/978-3-030-69284-1_20

Daud, K. A. M., Khidzir, N. Z., Hidayat, I. K., & Ismail, M. E. (2024). Empowering Art and Design Education via a Flexible Curriculum. *KnE Social Sciences*. https://doi.org/10.18502/kss.v9i15.16176

Deta, U. A., Laeliyah, I., Lestari, N. A., Yantidewi, M., Jauhariyah, M. N. R., & Prahani, B. K. (2023). Research trends on the emergency curriculum of the Covid-19 pandemic in physics learning through bibliometric analysis. *AIP conference proceedings.* 020013. https://doi.org/10.1063/5.0141367

Dvořák, D. (2023). Curriculum development. In *International Encyclopedia of Education (Fourth Edition)* (pp. 149–154). Elsevier. https://doi.org/10.1016/B978-0-12-818630-5.03024-4

Gersmehl, P. J., & Gersmehl, C. A. (2022). Education as "Mental Vaccine:" Designing Educational Materials About COVID-19. In S. D. Brunn & D. Gilbreath (Eds.), *COVID-19 and a World of Ad Hoc Geographies* (pp. 2039–2056). Springer International Publishing. https://doi.org/10.1007/978-3-030-94350-9_110

Kehinde, B. (2023). Supporting STEM Success: Digital Curriculum Innovations to Foster Student Retention. *International Journal of Scientific Research and Management (IJSRM)*, *11*(04), 982–1000. https://doi.org/10.18535/ijsrm/v11i04.ec3

Ninkov, A., Frank, J. R., & Maggio, L. A. (2021). Bibliometrics: Methods for studying academic publishing. *Perspectives on Medical Education*, *11*(3), 173–176. https://doi.org/10.1007/S40037-021-00695-4

Nundy, S., Kakar, A., & Bhutta, Z. A. (2022). Bibliometrics. In S. Nundy, A. Kakar, & Z. A. Bhutta, *How to Practice Academic Medicine and Publish from Developing Countries?* (pp. 317–330). Springer Nature Singapore. https://doi.org/10.1007/978-981-16-5248-6_34

Onyishi, C. N., & Sefotho, M. M. (2023). Inclusion and Higher Education Curriculum in the Post-COVID-19 Era and Implications for Technology-Based Learning: In C. E. M. Tabane, B. M. Diale, A. S. Mawela, & T. V. Zengele (Eds.), *Advances in Educational Technologies and Instructional Design* (pp. 38–57). IGI Global. https://doi.org/10.4018/978-1-6684-6995-8.ch003

Photopoulos, P., Stavrakas, I., & Triantis, D. (2021a). Post-COVID-19 Education: A Case of Technology Driven Change? In Csapo B. & Uhomoibhi J. (Eds.), *International Conference on Computer Supported Education, CSEDU - Proceedings* (Vol. 1, pp. 603–613).

Rahayu, R. I., Ay, M. H., Sonhadji, A. K. H., & Utaya, S. (2019). Life skills curriculum development at university. *International Journal of Civil Engineering and Technology*, *10*, 558–573.

Roberts, J. M. D. (2021). How might Covid-19 affect the biology curricula of the future? Two principles for curriculum developers to consider. *PROSPECTS*, *51*(1–3), 279–283. https://doi.org/10.1007/s11125-020-09531-9

Sagita, L., & Prahmana, R. C. I. (2022). The Visualization of the Impact of Covid-19 on Education Field: A Bibliometric Study. *Khizanah Al-Hikmah : Jurnal Ilmu Perpustakaan, Informasi, dan Kearsipan*, *10*(1), 12–24. https://doi.org/10.24252/kah.v10i1a2

Sihombing, A. A., Anugrahsari, S., Parlina, N., & Kusumastuti, Y. S. (2021). Merdeka Belajar in an Online Learning during The Covid-19 Outbreak: Concept and Implementation. *Asian Journal of University Education*, *17*(4), 35. https://doi.org/10.24191/ajue.v17i4.16207

Usman, M., & Ho, Y.-S. (2021). COVID-19 and the emerging research trends in environmental studies: A bibliometric evaluation. *Environmental Science and Pollution Research*, *28*(14), 16913–16924. https://doi.org/10.1007/s11356-021-13098-z

Zaidi, S. (2014). *Health and Disease: Curriculum for the 21st Century Medical Students*. Nova Science Publishers, Inc.

Zhang, L., Carter, R. A., Qian, X., Yang, S., Rujimora, J., & Wen, S. (2022). Academia's responses to crisis: A bibliometric analysis of literature on online learning in higher education during COVID-19. *British Journal of Educational Technology*, *53*(3), 620–646. https://doi.org/10.1111/bjet.13191