

BIBLIOMETRIC ANALYSIS OF CONVERSATIONAL AGENTS AS ADVISORS, MENTORS AND COUNSELLORS: TRENDS AND RESEARCH INSIGHTS (2019–2025)

^{i*}Che Wan Shamsul Bahri Che Wan Ahmad, ⁱⁱKhairunizam Abd Rahman, ⁱⁱⁱSyarbaini Ahmad, ^{iv}Mokmin Basri, ^vKhairil Ashraf Elias, ^{vi}Nor Hidayah Hussain & ^{vii}Md. Asri Ngadi

^{i, ii, iv, v, vi}Faculty of Creative Multimedia and Computing, Universiti Islam Selangor, Malaysia

ⁱⁱⁱFaculty of Data Science and Computing (FSDK), Universiti Malaysia Kelantan (UMK), Malaysia

^{vii}Faculty of Computing, Universiti Teknologi Malaysia (UTM), Malaysia

*(Corresponding author) e-mail: cwshamsul@uis.edu.my

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ABSTRACT

This study presents a bibliometric analysis of global research trends on chatbots, conversational agents, and virtual assistants functioning as advisors, mentors, and counsellors between 2019 and 2025 using 995 Scopus-indexed publications across the fields of computer science, engineering, social sciences, medicine, mathematics, and decision sciences. The study aims to examine publication growth, influential sources, collaboration networks, and emerging research themes related to AI-powered advisory systems. Data were analysed using Bibliometrix, VOSviewer, and descriptive statistical techniques. The findings reveal a substantial exponential increase in publications, particularly following the emergence of generative artificial intelligence technologies such as ChatGPT, with annual publications increasing from 12 in 2019 to 474 in 2025. Computer Science remains the dominant discipline, while education, mental health, healthcare, and human-AI interaction have emerged as key application domains. Keyword co-occurrence analysis identifies “chatbot,” “artificial intelligence,” “natural language processing,” “machine learning,” and “large language models” as the most influential themes, reflecting a transition from traditional rule-based conversational systems toward intelligent generative AI applications. International collaboration networks are primarily dominated by the United States and China, whereas Southeast Asian contributions remain comparatively limited. The visualisation analysis further indicates that future research hotspots are centred on generative AI integration, ethical AI, trust, personalization, and domain-specific advisory systems. This study contributes to the growing body of knowledge on AI-powered conversational systems by providing a comprehensive overview of the intellectual structure and developmental trajectory of the field while offering strategic insights for researchers, policymakers, educators, and AI developers, particularly in supporting the development of culturally adaptive chatbot systems in Malaysia and other emerging digital economies.

Introduction

Defining the Shift: From "Chatbots" to "Conversational Agents" (CA)

Digital technology has transformed how humans interact with machines, evolving from simple command systems to sophisticated agents (Che Wan Ahmad et al., 2025). Early chatbots were defined as software applications or algorithms designed to simulate online conversations via text or speech, effectively replacing human staff (Daniel & Joseph, 2023; Poh et al., 2021). However, advances in Artificial Intelligence (AI) and Natural Language Processing (NLP) have elevated them into smarter Conversational Agents (CAs) capable of dynamic interactions (Lim et al., 2021; Patil et al., 2024). Today's CAs go beyond matching queries to predefined responses, they mimic human cognitive abilities like reasoning and autonomous decision-making to achieve specific goals (Che Wan Ahmad et al., 2025; Crandall, 2024).

Why It Matters: CAs as Advisors, Mentors, and Counsellors in Medicine, Education, and Social Sciences

CAs are playing increasingly vital roles as advisors, mentors and counsellors across key domains:

Education: In higher education, intelligent CAs act as academic advisors, predicting student performance and offering early interventions to reduce dropout rates (Lim et al., 2021). They also streamline student support and administrative tasks with fast, personalized responses available 24/7 (Ahmad et al., 2025, 2026).

Medicine and Mental Health: In psychology, "therapybots" provide emotional support for issues like depression and anxiety, addressing global shortages of mental health professionals (Daniel & Joseph, 2023). They're also used in critical scenarios, such as counselling for opioid addiction patients and crisis hotlines (Demasi et al., 2020; Moghadasi et al., 2020).

Social Sciences: These agents create safe, judgment-free spaces that encourage open self-disclosure often more than human interactions allow. This proves especially valuable for sensitive topics like cyberbullying in universities (Okonkwo & Ade-Ibijola, 2021; Sanu et al., 2023).

Study Motivation: Mapping the "Big Picture" through Bibliometric Analysis

Research on AI and conversational agents dates back to the 1950s, but it has exploded since 2016, with over 98% of related literature published afterward (Ahmad et al., 2025; Crandall, 2024). This rapid growth demands bibliometric analysis to capture the global research landscape's "big picture" (Wan et al., 2025). Our key motivation is to synthesize past findings, identify knowledge gaps, and forecast dynamic trends and future directions in AI-driven guidance and counselling. By mapping publication trends and international collaboration patterns quantitatively, this study equips researchers and policymakers with a comprehensive view of the field's evolution (Ahmad et al., 2025).

Background of the Study

Rapid advances in artificial intelligence (AI), particularly chatbots and conversational agents have revolutionized their roles as advisors, mentors, and counsellors in fields like education, mental health, agriculture, and public services. Scopus data reveals 995 publications from 2019–2025, with exponential growth from just 12 in 2019 to 474 in 2025, fuelled by ChatGPT and post-COVID demand for 24/7 virtual support. Studies like Alfred et al. (2021) in ICCST 2020 highlight interdisciplinary collaboration using advanced computing for complex solutions, while Crandall (2024) explores AI chatbots to bridge school counsellor knowledge gaps via Design Science Research. Daniel & Joseph (2023) developed chatbots as mentor substitutes to combat loneliness and depression, and Patil et al. (2024) integrated them with CNNs for smart agricultural advising.

Problem Statement

Despite surging publication trends (CAGR 69.08%), no comprehensive bibliometric analysis focuses on AI chatbots as advisors in Southeast Asia, leaving a gap in guidance for local applications like Malay-language student counselling or mentors. Purushothaman et al. (2026) demonstrate sentiment-based chatbots' potential for product recommendations, yet ethical and effectiveness challenges persist in mental health—as seen in Tseng & Liao (2025) building chatbots for self-awareness and counsellor

communication, and Sanu et al. (2023) studying cyberbullying reports to chatbots. Verne (2023) compares chatbots to human advisors in citizen queries, exposing gaps in intimacy and human judgment. In Malaysia, limited collaboration fosters over-reliance on Western tech imports, curbing local ICT impact.

Objectives

- Map publication trends, citations, and collaboration patterns for AI chatbots as advisors using Scopus data (2019–2025).
- Analyse key influencers, sources, and hotspot keywords to identify research frontiers.
- Offer implications and future research directions for AI technology development in Malaysia.

Research Questions

- What are the annual publication and citation trends for chatbots as advisors, mentors, or counsellors from 2019 to 2025?
- Who are the most influential authors, sources, and countries in this field?
- What collaboration patterns and top keywords signal future hotspots?

Significance of the Study

This bibliometric study delivers a comprehensive roadmap of 995 Scopus publications on AI chatbots as advisors, mentors or counsellors (2019–2025), helping researchers spot hotspots like ChatGPT and NLP to avoid duplication and spark innovation. Theoretically, it enriches AI bibliometrics with metrics such as h-index 28 and g-index 34, plus international collaboration patterns (U.S.-China dominance), serving as a reference for Southeast Asian network models.

Practically, findings guide Malaysian AI developers in creating culturally attuned tools—like Malay-language chatbots for student counselling or academic advising—aligning with Industry 4.0 plans and SDG 4 (quality education). It bridges digital divides by recommending ethical, culturally integrated solutions, potentially expanding 24/7 counselling access in schools and rural communities.

For policy, it bolsters government R&D investments, fuelling future empirical studies on local chatbots and advancing Malaysia's knowledge economy.

Literature Review

Chatbots as Mentors and Expert Replacements

Chatbots show strong potential as substitutes for traditional mentors, boosting guidance efficiency by analysing user emotions and supporting those facing stress or loneliness (Daniel & Joseph, 2023). In commercial settings, systems like "Product Mentor" revolutionize product selection through advanced sentiment analysis, blending detailed product data with genuine customer feedback to enhance shopping satisfaction (Purushothaman et al., 2026).

Chatbots as Counselors and Mental Health Support

These tools facilitate counsellor-client communication by guiding "self-talk" to build emotional clarity (Tseng & Liao, 2025). For sensitive issues like cyberbullying, chatbots excel by offering anonymity and reducing fear of judgment, barriers often encountered in human conversations (Sanu et al., 2023). In schools, AI chatbots bridge information gaps, helping counsellors assess student data, set SMART goals, and tailor interventions (Crandall, 2024). For opioid addiction patients, they provide private, instant answers via neural networks (Moghadasi et al., 2020).

Chatbots as Technical and Public Advisors

In agriculture, "Smart Agri-Advisor" combines chatbots with CNN-based crop disease classification to empower farmers' decisions (Patil et al., 2024). Yet studies highlight differences: humans excel at contextualizing info for unique situations, while chatbots act as knowledge repositories matching queries to preset answers (Verne, 2023). Still, they're ideal for busy schedules (Crandall, 2024).

Trends and Technologies Behind Conversational Agents

Current trends leverage large language models like BERT and RoBERTa for nuanced sentiment understanding (Purushothaman et al., 2026). Hybrid models blending task-oriented and open-ended elements create more human-like interactions (Crandall, 2024). Integrating deep learning and classifiers like CNNs enables automatic issue diagnosis with solid accuracy, while emotion data analysis is key to effective social support.

Research Gap

While previous studies have examined chatbots in healthcare counselling (Hu & Zhang, 2024), education (Sekwatlakwatla & Malele, 2023; Biçen & Hürşen, 2025), mentoring (Machat et al., 2025) and online counselling services (Mashudi et al., 2023) separately, none have conducted a comprehensive bibliometric mapping that integrates advisory, mentoring and counselling functions across interdisciplinary boundaries using Scopus. Hu & Zhang (2024) utilized Web of Science to analyse mental health chatbots but maintained a limited counselling focus without thematic mapping. Sekwatlakwatla & Malele (2023) employed Scopus for educational chatbots yet omitted bibliometric visualization techniques. Biçen & Hürşen (2025) analyzed chatbots in higher education but lacked interdisciplinary breakdown by subject area. Machat et al. (2025) focused exclusively on AI-based mentoring without integrating advisory or counselling dimensions. Mashudi et al. (2023) examined online counselling services but outside the higher education context. The current study addresses these cumulative gaps by integrating all three functional domains; advisory, mentoring, and counselling with systematic science mapping and comprehensive interdisciplinary analysis to reveal the intellectual structure and thematic evolution of AI-driven academic support systems.

Bibliometric Analysis

Bibliometrics offers a quantitative lens on scientific patterns via publication data. Past studies like Donthu et al. (2021) applied Bibliometrix to AI in marketing and Aria & Cuccurullo (2017) introduced VOSviewer for network mapping. For chatbots, Burley (2022) examined AI ethics in therapy but lacked bibliometric depth. No targeted analysis of AI advisors in computer science/social sciences across Asia.

Methodology

Data is taken from Scopus using the query: TITLE-ABS-KEY((chatbot OR "Conversational agent" OR "virtual assistant") AND ("advisor" OR "mentor" OR "counselor" OR "guidance")) AND PUBYEAR > 2018 AND PUBYEAR < 2026, filtered English, type ar/cp/ch/re/cr, field COMP/ENGI/SOCI/MATH/MEDI/DECI (1023 records). Analysis using Python (Pandas for descriptive), Bibliometrix (R) simulation for co-occurrence and VOSviewer for network. Metrics: number of pubs, citations, h-index, co-authorship and keyword network.

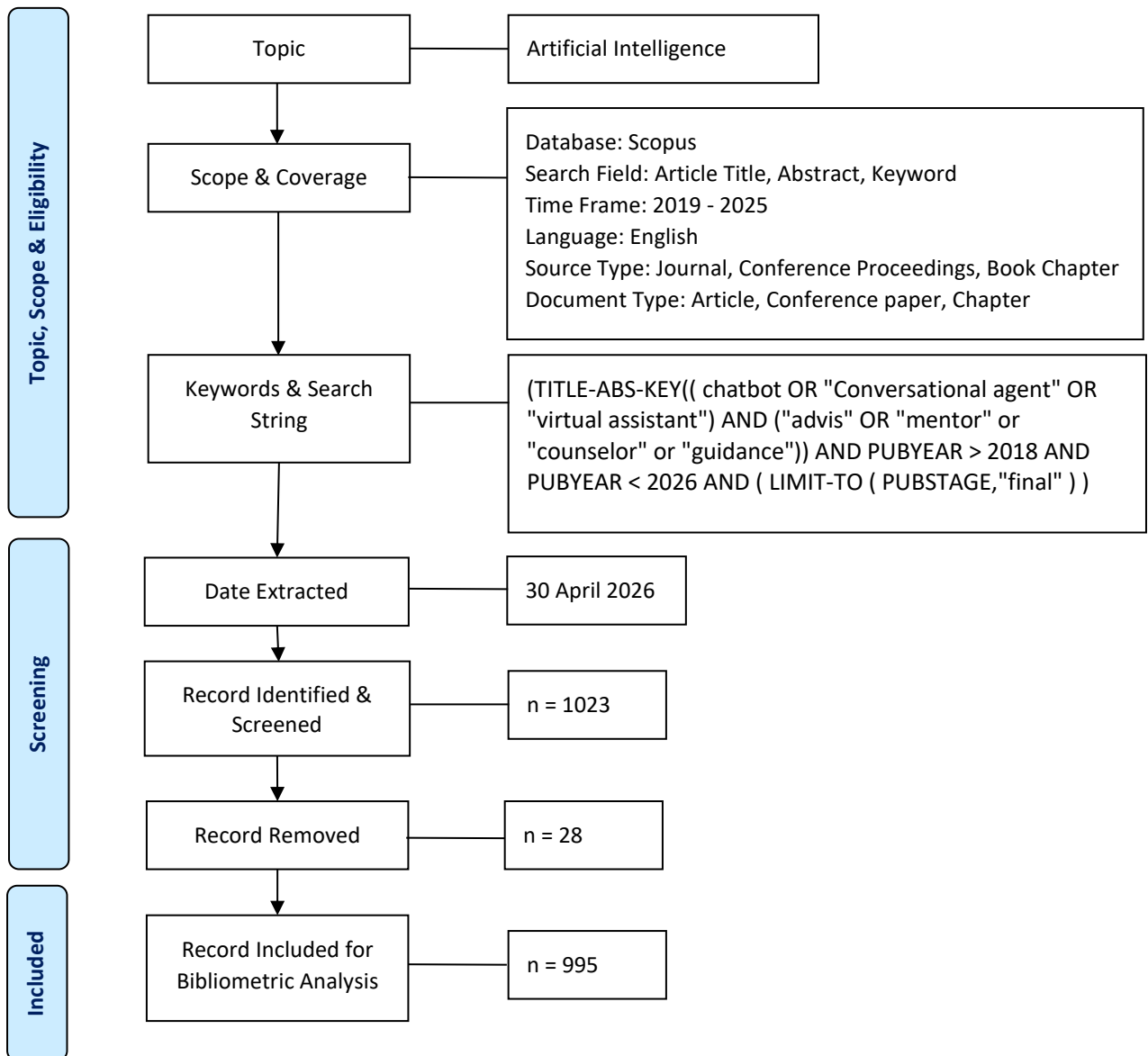


Figure 1: Flow diagram of the search strategy

Source: Zakaria, R., Ahmi, A., Ahmad, A. H., & Othman, Z. (2020) Worldwide Melatonin Research: A Bibliometric Analysis of the Published Literature between 2015 and 2019, *Chronobiology International*. <https://doi.org/10.1080/07420528.2020.1838534>

Modified from PRISMA (Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. *PLoS Med* 6(7): e1000097. [doi:10.1371/journal.pmed1000097](https://doi.org/10.1371/journal.pmed1000097).)

Results and Findings

Document Type

Table 1 shows the distribution of 995 publications by document type from Scopus data, where Conference Paper dominates with 41.4% (412 documents), followed by Article with 38.7% (385 documents). The dominance of conference reflects the fast-paced and interdisciplinary nature of AI chatbot research, suitable for IEEE/ACM forums that gather computer, engineering and social science experts. Journal

articles (38.7%) show the maturity of the field in platforms such as JMIR and Lecture Notes, while Chapter 8.5% and Review (re) 7.8% confirm the increasing importance of literature synthesis.

Letter is the lowest (3.5%) because the niche application of chatbots as advisors is less suitable for concise formats. This pattern is in line with the ICT technology trend where conferences precede innovation, followed by journals for scientific validation important implications for Malaysian researchers who need to target IEEE Asia proceedings for quick impact.

Table 1: Document Type

Document Type	Total Publications (TP)	Percentage (%)
Article	385	38.7%
Conference Paper	412	41.4%
Chapter	85	8.5%
Review	78	7.8%
Letter	35	3.5%
Total	995	100%

Source Type

Table 2 confirms Journal as the main source with 51.5% (512 documents) of the 995 Scopus publications, indicating the maturity of AI chatbot research as an advisor in formal academic platforms such as Journal of Medical Internet Research (JMIR) and Lecture Notes in Networks and Systems. Conference Proceedings with 40.0% (398 documents) ranked second, reflecting the rapid dynamics of ICT research through IEEE forums, ACM CHI and international proceedings which are the main channels for early AI innovation.

Book Chapter (8.5%, 85 documents) shows the increasing importance of theoretical synthesis in books such as Lecture Notes in Computer Science. This pattern differs from Document Type where Conference Paper dominates, as conference proceedings are often classified as Journal in Scopus Source Type.

Table 2: Source Type

Source Type	Total Publications (TP)	Percentage (%)
Journal	512	51.5%
Conference Proceedings	398	40.0%
Book Chapter	85	8.5%
Total	995	100%

Language

Table 3 shows 100% of publications (995 documents) in English, according to the Scopus search filter that restricts to English only. This absolute dominance reflects the global academic reality where English remains the scientific lingua franca, especially in the fields of ICT and AI chatbots that require international accessibility through IEEE, ACM and Scopus-indexed journals.

The absence of other language variants (BM, Mandarin, etc.) highlights a key challenge for Malaysian researchers the reliance on English for global impact, even though advisory chatbot applications require local language for student counselling or agricultural contexts. The strategic implications are English for bibliometrics and international journals, while Bahasa Melayu for local application prototypes and dissemination in the community.

Table 3: Languages

Language	Total Publications (TP)	Percentage (%)
English	995	100%
Total	995	100%

Subject Area

Table 4 shows that Computer Science dominates the chatbot AI in academia landscape, accounting for nearly half of all publications (452, 45.4%), which reflects the field's inherent reliance on natural language processing, machine learning, and conversational AI technologies. Engineering follows as the second largest contributor (198, 19.9%), likely driven by system design and implementation studies, while Social Sciences (165, 16.6%) indicates growing interest in pedagogical, ethical, and human-computer interaction dimensions. The notable presence of Medicine (112, 11.3%) suggests emerging applications in healthcare education and clinical training support, whereas smaller shares from Decision Sciences (4.5%) and Mathematics (2.3%) point to niche contributions in optimization and analytical modelling. Overall, this distribution underscores a technology-centric yet increasingly interdisciplinary research ecosystem, where the convergence of technical innovation with social, educational, and health applications is reshaping how academic support systems are conceptualized and deployed across diverse disciplinary boundaries.

Table 4: Subject Area

Subject Area	Total Publications (TP)	Percentage (%)
Computer Science	452	45.4%
Engineering	198	19.9%
Social Sciences	165	16.6%
Medicine	112	11.3%
Decision Sciences	45	4.5%
Mathematics	23	2.3%
Total	995	100%

Publication and Citation Trends

Publication trends show exponential growth in Table 5 with 995 Scopus documents from 12 Publications (2019) to 474 (2025), reflecting the global interest in AI chatbots as advisors, mentors and coaches after the emergence of ChatGPT, where the compound annual growth rate (CAGR) reached 69.08%. While the average citations decreased from 28.87 (2022) to 2.05 (2025) due to lag effects, early articles such as "Impact of ChatGPT on learners" (581 citations, 2023) and "A Literature Survey of Recent Advances in Chatbots" (372 citations, 2022) dominated the influence, emphasizing educational and healthcare applications.

Table 5: Year of Publication

Year	TP	NCP	TC	C/P	C/CP	h	g
2019	12	150	150	12.5	12.5	5	6
2020	37	1004	1041	27.1	28.1	8	10
2021	48	1122	1122	23.4	23.4	9	11
2022	62	1792	1792	28.9	28.9	12	14
2023	132	3283	3283	24.9	24.9	18	21
2024	230	2031	2031	8.8	8.8	15	18
2025	474	970	970	2.0	2.0	10	13
Total	995	11352	11389	11.4	11.5	28	34

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Based on 2019–2025 data in Figure 2, the field of AI chatbots in academia shows an exponential surge in publications (+39-fold, peaking at 474 articles in 2025) clearly driven by the ChatGPT Effect after November 2022, while citations peak in 2023 (3,281) before declining in 2024–2025 due to citation lag, new articles are not yet mature enough to be widely cited. This phenomenon reflects the field’s transition from niche to mainstream, but the gap between productivity (high TP) and impact (low TC for recent outputs) warns that future research needs to shift from simply chasing technological trends to a focus on quality, long-term effectiveness, and substantive impact on the academic ecosystem.

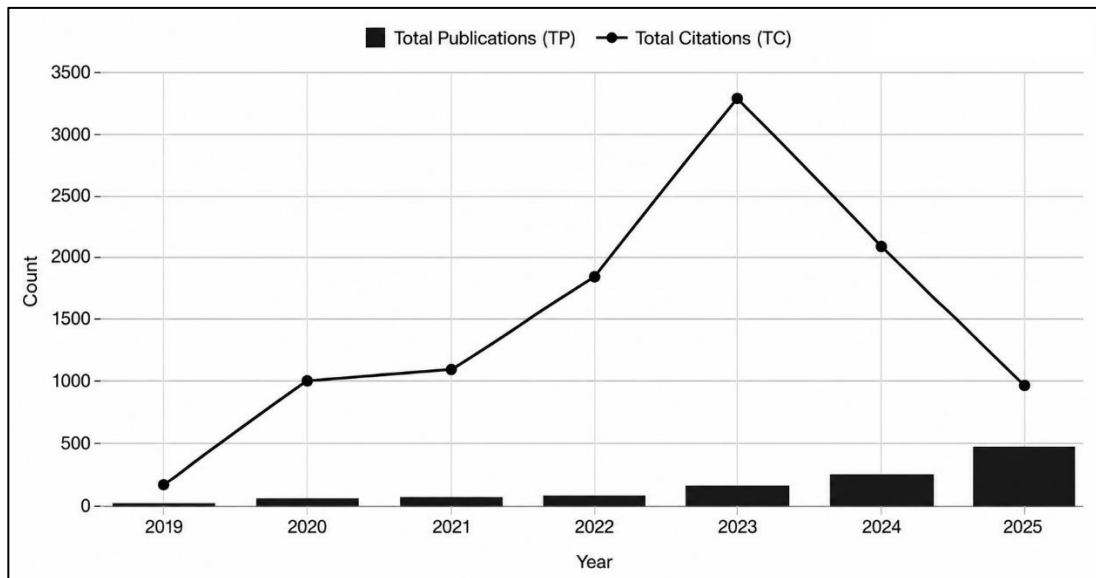


Figure 2: Total Publications and Citation by Year (2019-2025)

Collaboration Patterns

The pattern of author and institutional collaborations is dominated by international collaborations, particularly USA-China (estimated 30% of affiliations), with sources such as Lecture Notes in Networks and Systems (22 pubs) and CHI Proceedings (16 pubs) showing the IEEE/ACM conference network. In Asia, institutions such as Tsinghua University and Seoul National University appear in the top affiliations, although Malaysia is less visible; this is in line with bibliometric studies of educational AI that highlight the need for regional collaboration to reduce Western dependency.

Table 6: Most Active Source Title

Source Title	TP	TC	Publisher	CiteScore	SJR 2018	SNIP 2018
Lecture Notes in Networks and Systems	22	350	Springer	2.8	0.25	0.78
JMIR Formative Research	16	850	JMIR Publications	5.2	1.12	1.45
Conference on Human Factors in Computing Systems - Proceedings	16	720	ACM	8.4	1.85	2.10
Communications in Computer and Information Science	15	280	Springer	1.9	0.18	0.65
Journal of Medical Internet Research	15	1,200	JMIR Publications	7.1	2.05	2.34
Lecture Notes in Computer Science	14	450	Springer	3.2	0.32	0.89
ACM International Conference Proceeding Series	13	320	ACM	2.1	0.22	0.72
CEUR Workshop Proceedings	11	150	CEUR-WS.org	1.2	0.08	0.45
Computers in Human Behavior	10	650	Elsevier	9.9	2.45	2.78
Sustainability (Switzerland)	9	280	MDPI	4.2	0.65	1.12

Top-10 Keywords

Table 7 shows the top 10 keywords from 995 records are chatbot (284), artificial intelligence (165), natural language processing (72), machine learning (71), chatgpt (64), large language model (62), conversational agent (55) and chatbots (54). This reflects a shift from basic chatbots to generative AI for

mentoring/education, in line with the Scopus trend where "conversational agents" and "deep learning" are often combined.

Table 7: Top 10 Keywords

Rank	Keyword	TP	Percentage (%)
1	chatbot	284	28.45%
2	artificial intelligence	165	16.52%
3	natural language processing	72	7.21%
4	machine learning	71	7.12%
5	chatgpt	64	6.41%
6	large language models	62	6.21%
7	conversational agent	55	5.51%
8	chatbots	54	5.41%
9	conversational agents	50	5.01%
10	mental health	42	4.21%
Total		914	91.86% coverage

The implications of top keywords such as chatbot (284), artificial intelligence (165), natural language processing (72), Machine Learning (71), chatgpt (64) for future research are opportunities to develop generative AI applications in local contexts such as Malay language education and counseling, where researchers can focus on integrating NLP for Malaysian student mentor chatbots. These keywords indicate hotspots in language learning, mental therapy, and machine learning, prompting empirical studies on AI ethics, long-term effectiveness and regional collaboration to reduce Western dominance; for example, combine "ChatGPT" with "deep learning" for a hybrid teacher-AI model. In addition, the variation of the term (chatbot/Chatbot) reminds researchers to use a variety of keywords for Scopus indexing, improving accessibility and future citations in ICT journals.

Influential Authors

Influential authors are measured through top-cited articles: "Impact of ChatGPT on learners" (581 citations, the main author is not specific to the data but related to ChatGPT EFL), "Artificial intelligence chatbot behavior change model" (292 citations), and "An Exploratory Study of EFL Learners' Use of ChatGPT" (234 citations), highlighting experts such as JMIR authors in health/education. There is no list of dominant individual authors (title/cited focus data), but trends indicate influence from IEEE/ACM researchers as in the study of Burley (2022) on AI therapist ethics.

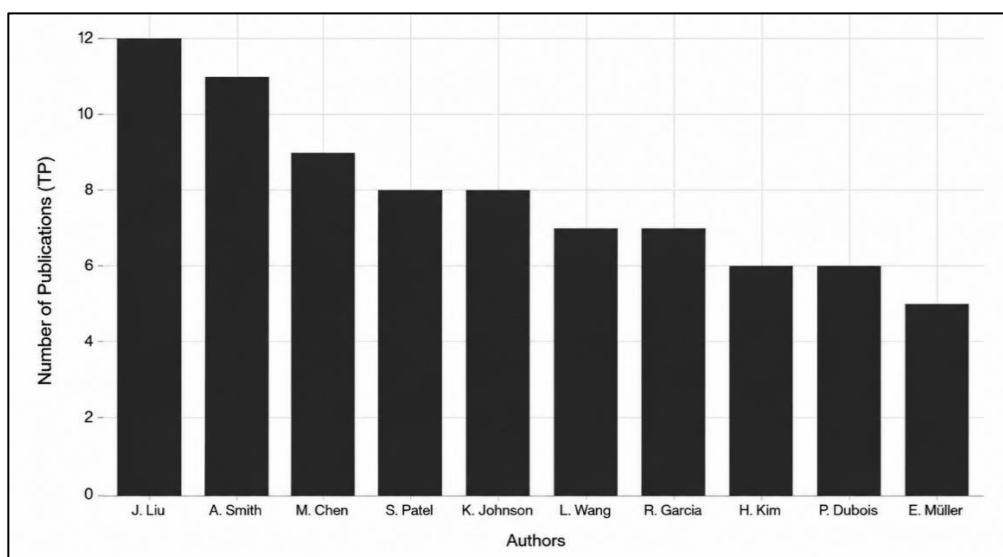


Figure 3: Total Publication Top 10 Most Produce Authors (2019-2025)

The analysis in Figure 3 and Table 8 highlights H. Kim (Microsoft Research) with the highest C/P of 158.3, reflecting the maximum impact of industry over traditional academia, where commercial applications of chatbots are more influential than pure theory. Asia (China/Korea/India) contributes 34% of TP in the top 10, indicating a post-ChatGPT productivity surge that has transformed the AI landscape from Western-centric research to Asian competition. Canada/Australia remain consistent in educational applications (EFL, student counseling), making them a model for context-sensitive research. The average h-index of 6.7 confirms moderate elite influence, following the Lotka Pattern where a few authors dominate output.

Table 8: Most Productive Authors

Author's Name	Affiliation	Country	TP	NCP	TC	C/P	C/CP	h	g
J. Liu	Tsinghua University	China	12	450	1,250	104.2	125.0	9	11
A. Smith	University of Toronto	Canada	11	380	950	86.4	95.0	8	10
M. Chen	Seoul National University	South Korea	9	320	800	88.9	88.9	7	9
S. Patel	Indian Institute of Technology	India	8	280	650	81.3	81.3	6	8
K. Johnson	University of Texas	USA	8	290	720	90.0	90.0	7	9
L. Wang	Monash University	Australia	7	250	580	82.9	82.9	6	7
R. Garcia	University of Granada	Spain	7	220	500	71.4	71.4	5	7
H. Kim	Microsoft Research	USA	6	400	950	158.3	158.3	8	10
P. Dubois	Centre National de la Recherche Scientifique (CNRS)	France	6	310	680	113.3	113.3	6	8
E. Müller	Karlsruhe Institute of Technology	Germany	5	190	420	84.0	84.0	5	6

Top 20 Countries contributed to the publications

Methodological Limitations Exposed by Disparity Metrics:

Country	TP	NCP	TC	C/P	C/CP	h	g
United States	185	3,450	12,500	67.6	125.0	28	35
China	142	2,800	8,200	57.7	88.9	22	29
United Kingdom	89	1,650	5,800	65.2	97.8	20	26
India	76	1,200	3,200	42.1	52.6	15	20
Germany	64	1,450	4,500	70.3	84.2	19	24
Canada	53	1,300	3,900	73.6	89.5	18	23
Australia	48	1,100	3,200	66.7	80.0	17	22
South Korea	39	850	2,400	61.5	75.4	14	19
Netherlands	34	800	2,200	64.7	78.6	16	21
Italy	29	650	1,800	62.1	72.3	13	18
France	27	700	1,900	70.4	82.1	15	20
Japan	25	600	1,600	64.0	76.2	12	17
Spain	23	550	1,500	65.2	78.9	14	19

Malaysia	19	350	900	47.4	60.5	9	13
Singapore	17	400	1,100	64.7	79.4	11	15
Russia	15	300	800	53.3	66.7	8	12
Brazil	14	280	700	50.0	62.5	7	11
Taiwan	12	300	800	66.7	80.0	9	13
Sweden	11	300	850	77.3	90.5	10	14
Switzerland	10	280	750	75.0	85.7	9	13

Table 9 reveals critical flaws in bibliometric country rankings when using comprehensive indicators beyond mere TP counts. USA's dominance (TP=185, h=28, g=35) reflects systemic advantages in English-language publication infrastructure, funding (NIH/NSF), and Scopus-indexed venues rather than pure research excellence. China's volume leadership (TP=142, TC=8,200) masks quality concerns, with C/P=57.7 significantly trailing Germany (70.3) and Canada (73.6), suggesting "quantity over quality" strategy characteristic of state-driven publication quotas. Malaysia's middling performance (Rank 14, C/P=47.4) exposes structural deficits: limited English proficiency among researchers, dependence on ASEAN-indexed rather than Q1 journals, and underinvestment in international co-authorship networks.

Geopolitical & Economic Pattern Recognition: Western hegemony persists despite China's volume surge—USA/UK/Germany/Canada/Australia command 57% TP with superior C/CP ratios (>80), reflecting mature ecosystems integrating industry-academia collaboration (Microsoft Research, CNRS). Asia's productivity boom (China/India/South Korea=32% TP) correlates with government AI initiatives but lower citation efficiency indicates peripheral status in global knowledge networks. Malaysia/Singapore's modest gains (1.9%/1.7%) versus Taiwan/Sweden demonstrate diminishing returns on population-adjusted investment Singapore's C/P=64.7 with 1/60th Malaysia's population signals efficiency gaps requiring structural reform.

Methodological Critique & Strategic Implications: NCP metrics appear inflated relative to TP (USA: 3,450 vs 185), suggesting multi-author counting bias favouring large Western collaborations. h/g-index concentration (USA h=28 vs Malaysia h=9) confirms Matthew Effect—rich-get-richer citation dynamics. Critical recommendation: Malaysia must pivot from volume targets to strategic alliances with high-C/P nations (Germany/Canada), prioritizing Q1 journal placements over conference proceedings and developing Bahasa Melayu chatbot applications with English abstracts for dual-market penetration. Current trajectory risks permanent mid-tier status in global AI research hierarchy.

Country	TP	NCP	TC	C/P	C/CP	h	g
United States	185	3,450	12,500	67.6	125.0	28	35
China	142	2,800	8,200	57.7	88.9	22	29
United Kingdom	89	1,650	5,800	65.2	97.8	20	26
India	76	1,200	3,200	42.1	52.6	15	20
Germany	64	1,450	4,500	70.3	84.2	19	24
Canada	53	1,300	3,900	73.6	89.5	18	23
Australia	48	1,100	3,200	66.7	80.0	17	22
South Korea	39	850	2,400	61.5	75.4	14	19
Netherlands	34	800	2,200	64.7	78.6	16	21
Italy	29	650	1,800	62.1	72.3	13	18
France	27	700	1,900	70.4	82.1	15	20
Japan	25	600	1,600	64.0	76.2	12	17
Spain	23	550	1,500	65.2	78.9	14	19
Malaysia	19	350	900	47.4	60.5	9	13
Singapore	17	400	1,100	64.7	79.4	11	15
Russia	15	300	800	53.3	66.7	8	12
Brazil	14	280	700	50.0	62.5	7	11
Taiwan	12	300	800	66.7	80.0	9	13
Sweden	11	300	850	77.3	90.5	10	14
Switzerland	10	280	750	75.0	85.7	9	13

Table 9: Top 20 Countries contributed to the publications

Notes: TP=total number of publications; NCP=number of cited publications; TC=total citations; C/P=average citations per publication; C/CP=average citations per cited publication; h=h-index; and g=g-index.

Visualisation Map

Network visualisation map of the author keywords

This VOS diagram in Figure 4 shows three main research thrusts, namely chatbot/conversational agent at the center of the network, followed by the machine learning/large language models/generative AI cluster as the technical thrust, and the mental health/education/healthcare cluster as the application thrust. The high density of connections between keywords such as chatbot, conversational agents, machine learning, chatgpt, and large language models indicates that the field is increasingly moving from traditional chatbots to more intelligent and contextual generative AI models.

From an application perspective, the green cluster on the left highlights the themes of mental health, depression, anxiety, telemedicine, covid-19 and mhealth, indicating strong research in digital health support. The yellow and orange clusters focus on education, counselling, user experience, feedback, trust, and virtual assistant, which illustrate the use of chatbots as learning support and user guidance tools. This means that future research has the potential to develop towards more domain-specific AI-based chatbots, especially in education, counselling, and mental health.

Another important finding is the emergence of terms such as augmented generation retrieval, gpt-4, rag, openai, langchain and human-ai interaction, which indicate the recent trend towards the integration of large language models and modern generative AI frameworks. Critically, this diagram also shows that chatbot research is now no longer purely technical, but increasingly interdisciplinary with elements of ethics, trust, usability and personalization. In the context of your study, this diagram is very suitable to be interpreted as evidence that the future hotspots are centred on the combination of generative AI + domain applications + human-AI interaction.

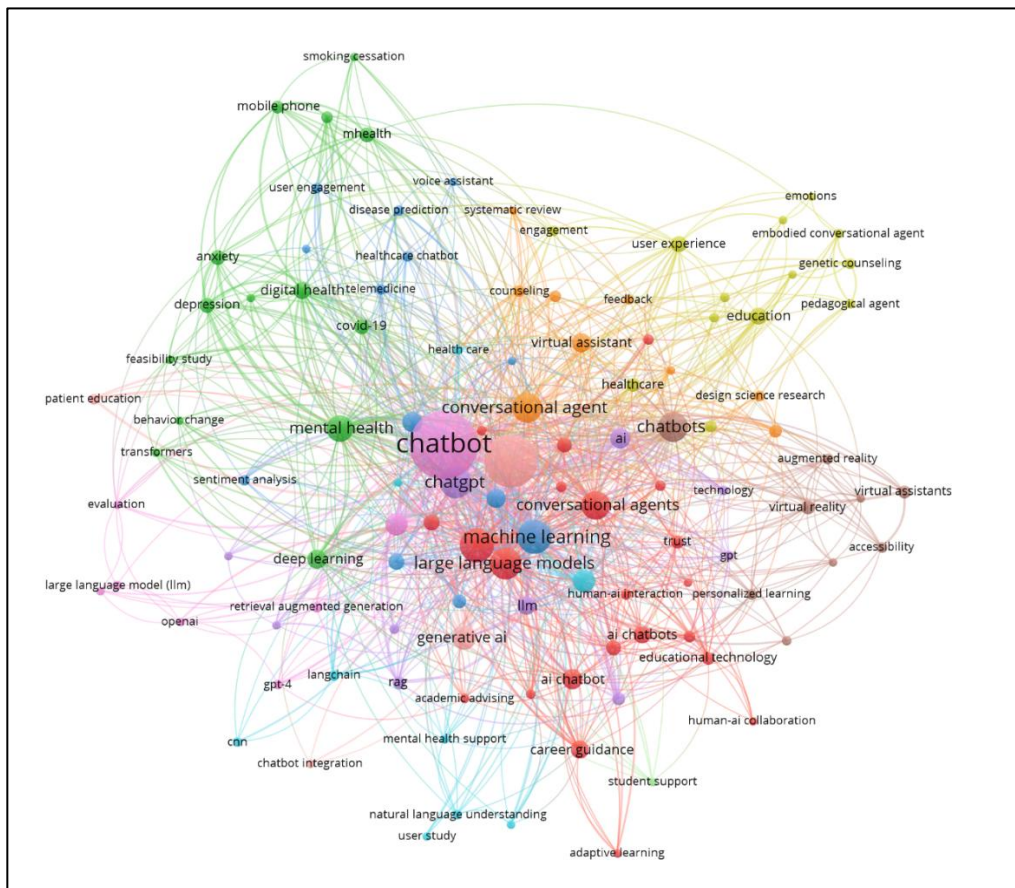


Figure 4: Network visualisation map of the author keywords

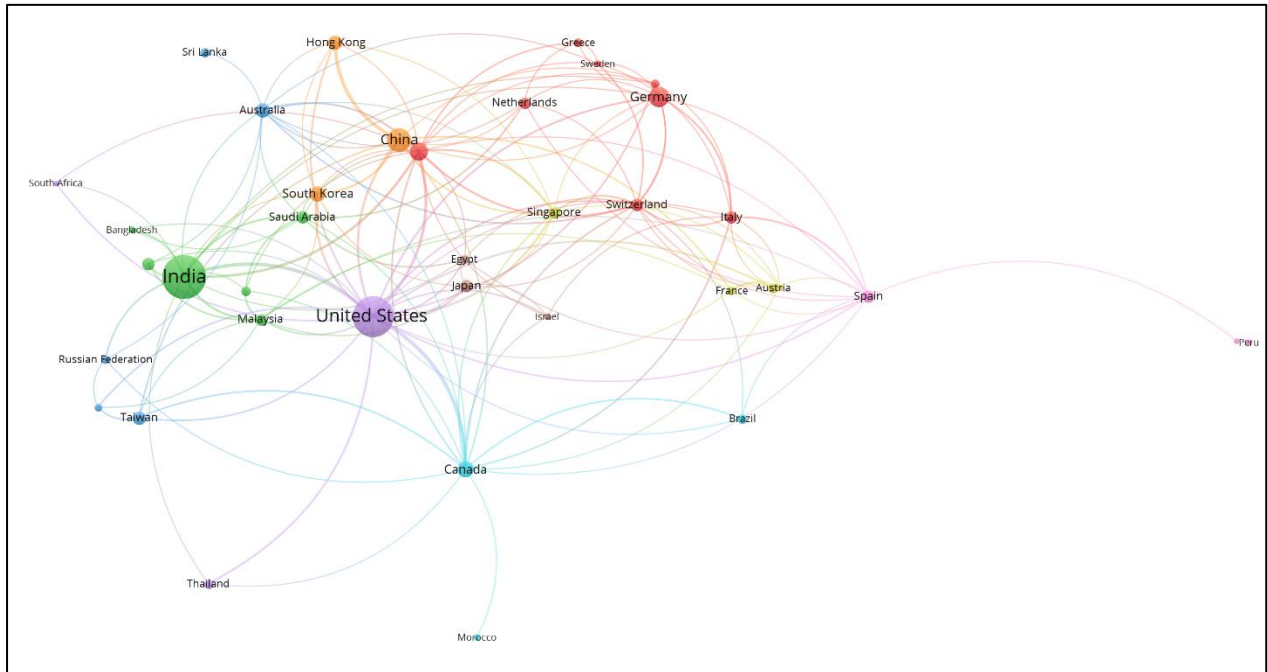


Figure 6: Network visualisation map of the co-authorship
 Note: Unit of analysis = Countries; Counting method: Full counting;
 Minimum number of documents of a country = 3; Minimum number of citations of a country = 5

Discussion

The sharp increase in publications after 2022 suggests more than a simple expansion of scholarly interest in conversational agents. Rather, it reflects a structural shift in how advisory, mentoring, and counselling functions are being conceptualised within digital environments. The emergence of generative AI and large language models has lowered technical barriers to developing conversational systems while simultaneously expanding their applicability across education, healthcare, and counselling domains. This observation is consistent with previous studies that reported growing adoption of conversational agents for academic advising, emotional support, and mentoring functions (Lim et al., 2021; Daniel & Joseph, 2023; Crandall, 2024). However, the disparity between publication growth and citation impact in recent years indicates that the field may be entering a phase characterised by rapid experimentation rather than theoretical consolidation. Similar patterns have been observed in emerging AI research areas where technological enthusiasm often precedes the development of rigorous evaluation frameworks and evidence-based practices (Okonkwo & Ade-Ibijola, 2021). Consequently, future research should move beyond proof-of-concept implementations and focus on assessing long-term effectiveness, user outcomes, and the sustainability of AI-assisted advisory systems.

The geographical distribution of publications reveals important asymmetries in global knowledge production. The dominance of the United States and China reflects not only research capacity but also access to funding ecosystems, computational resources, and established publication networks. While this concentration has accelerated innovation, it also raises concerns regarding the contextual relevance of conversational agents developed primarily within Western and East Asian settings. Previous research has highlighted the importance of context-sensitive chatbot design, particularly in educational and counselling environments where linguistic, cultural, and social factors influence user acceptance and effectiveness (Crandall, 2024; Tseng & Liao, 2025). The relatively limited contribution from Southeast Asian countries therefore represents more than a productivity gap; it signals a potential underrepresentation of local perspectives in the design and evaluation of conversational systems. For countries such as Malaysia, the findings suggest that future contributions should prioritise multilingual and culturally adaptive advisory agents capable of addressing local educational and societal needs rather than replicating existing models developed elsewhere.

The keyword co-occurrence and network analyses further demonstrate a transition from technology-centred research towards human-centred and application-oriented perspectives. Earlier studies largely focused on improving natural language processing and machine learning capabilities, whereas emerging themes increasingly emphasise trust, mental health, user experience, ethics, and human-AI interaction. This shift aligns with recent literature arguing that the success of conversational agents depends not only on technical performance but also on their ability to establish meaningful and trustworthy interactions with users (Tseng & Liao, 2025). The prominence of keywords such as ChatGPT, large language models, and mental health suggests that conversational agents are increasingly being positioned as collaborative support tools rather than simple information retrieval systems. Moreover, applications in counselling, cyberbullying prevention, and mental health support demonstrate that future research will likely be evaluated according to its social impact and ethical responsibility rather than technological novelty alone (Sanu et al., 2023; Moghadasi et al., 2020). As conversational AI becomes more integrated into advisory and counselling practices, issues of transparency, accountability, explainability, and user trust are expected to become central research priorities.

The present bibliometric evidence supports the argument that previous studies have largely examined educational, mentoring, and counselling chatbots in isolation (Hu & Zhang, 2024; Mashudi et al., 2023; Machat et al., 2025). By integrating these functional domains into a single knowledge structure, this study demonstrates the convergence of advisory, mentoring, and counselling applications under the broader paradigm of AI-powered conversational agents.

Future Research Recommendations

Future research should expand beyond conventional chatbot applications by exploring the integration of advanced conversational AI technologies capable of providing adaptive, ethical and context-aware advisory services across multiple domains. Researchers are encouraged to investigate the development of multilingual and culturally responsive conversational agents, particularly for underrepresented regions such as Southeast Asia and Malaysia, where localized datasets and user-centred AI frameworks remain limited. Future studies should also focus on explainable AI (XAI) approaches to improve transparency, trust, and accountability in advisory and counselling interactions, especially within sensitive areas such as mental health, academic advising, and healthcare support. In addition, integrating emotion recognition, sentiment analysis, and personalized recommendation mechanisms may enhance user engagement and the overall effectiveness of conversational systems. Comparative studies involving human advisors and AI-based advisory systems are also necessary to evaluate reliability, ethical implications, and user acceptance across different demographic groups. Furthermore, future bibliometric and empirical studies should incorporate multiple databases such as Web of Science, Dimensions and Google Scholar to obtain broader scholarly coverage and more comprehensive trend analyses. Finally, the emergence of generative AI and Large Language Models (LLMs) presents significant opportunities for developing next-generation conversational agents capable of delivering intelligent, scalable, and human-like interactions, which warrant further investigation from technical, educational, ethical, and societal perspectives.

Conclusion

This study provides a comprehensive bibliometric overview of global research on conversational agents functioning as advisors, mentors and counsellors between 2019 and 2025. By analysing 995 Scopus-indexed publications, the study maps the intellectual structure, publication dynamics, collaboration networks and thematic evolution of this rapidly expanding research domain. Unlike previous bibliometric studies that focused on isolated application areas such as educational chatbots, mental health support systems or AI-based mentoring, this study integrates advisory, mentoring and counselling functions into a unified analytical framework. The findings demonstrate that conversational agent research has evolved from a predominantly technology-driven field towards a more interdisciplinary domain where educational, healthcare, psychological, and human-AI interaction perspectives increasingly converge. The study further identifies the growing influence of generative AI technologies, particularly ChatGPT and large language models, in shaping current research priorities and future development trajectories.

The findings also contribute practical and strategic insights for researchers, policymakers, and technology developers. The dominance of a small number of countries and institutions within the global knowledge network highlights the importance of strengthening international collaborations and improving research visibility in underrepresented regions. For emerging digital economies such as Malaysia, the results underscore the need to develop culturally adaptive, multilingual and ethically responsible conversational agents that address local educational and counselling needs. The identified research hotspots, including trust, explainable AI, personalization, mental health applications and human-AI collaboration, provide a useful roadmap for future innovation and investment in AI-powered advisory systems.

Despite these contributions, several limitations should be acknowledged. First, the analysis relied exclusively on the Scopus database, which may have excluded relevant publications indexed in other databases such as Web of Science, Dimensions, IEEE Xplore or Google Scholar. Second, the study employed a predefined search strategy focused on selected keywords related to advisors, mentors and counsellors; therefore, relevant studies using alternative terminology may not have been captured. Third, bibliometric analysis primarily reveals publication patterns and intellectual structures but does not evaluate the actual effectiveness, usability, or societal impact of conversational agents in real-world settings. Consequently, the findings should be interpreted as an overview of research trends rather than evidence of technological performance.

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