

Research Article

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Lifelong Learning for Active Aging: A Bibliometric Analysis from 2002 to 2024

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Abstract

Background/purpose. As populations worldwide continue to age, lifelong learning (LLL) is increasingly recognized as essential to promoting active aging, ensuring older adults' well-being, productivity, and societal engagement. However, despite policy emphasis, global participation rates in LLL among older adults remain low. This study addresses the challenges and trends in lifelong learning for active aging, aiming to explore barriers and identify innovative directions for more inclusive and effective adult education.

Materials/methods. A bibliometric analysis was conducted using Scopus data from 2002 to 2024. A total of 498 publications were analyzed through VOSviewer and Biblioshiny to identify thematic trends, leading countries, key sources, citation metrics, and author contributions. Co-occurrence and co-citation analyses were used to map the conceptual and collaborative structure of the research field.

Results. The field has continued to grow steadily, with notable contributions from countries in Europe and North America. Common research themes include digital access, learning between generations, and psychological factors that influence learning. However, challenges such as low learner motivation, rigid institutional structures, and uneven policy support still exist. New approaches like andragogy and cybergogy are being explored as ways to improve learner engagement and adaptability in digital learning environments.

Conclusion. LLL plays a pivotal role in promoting active aging, yet is hindered by motivational, institutional, and systemic challenges. Embracing flexible, learner-centered paradigms and expanding digital learning infrastructures can improve participation. Future policies should emphasize inclusive, personalized, and context-sensitive approaches to make lifelong learning accessible and relevant to older adults globally.

1. Introduction

The idea of lifelong learning emerged in the early 1960s, strongly advocated by organizations such as UNESCO and the Council of Europe, as a response to the growing need for adult and continuing education (Popović & Koulaouzides, 2017). It was seen as a means to enhance quality of life in later years and to support the development of knowledge-based societies aligned with sustainable economic goals. Although the terminology and implementation have varied across regions, ranging from “social education” and “continued education” to phrases like “the entire life is a school”, the roots of lifelong learning can be traced back even earlier. For instance, the Committee for Adult Education was established in Great Britain in 1919; community-based lifelong learning practices began in Japan as early as 1949; and similar movements were observed in Australia around 2005 (Fleming, 2020).

Education has long been recognised as a constant requirement for societal change as well as a dynamically changing world through its transformation function (Barbabella et al., 2022). As a result, LLL expects to encourage active older people to contribute to national social-ecological sustainable development as the population ages (Nylander et al., 2022).

Several studies have found that LLL has favourable effects on a variety of aspects of one's life, including economics, politics, and society (Khan et al., 2025). LLL, for example, promotes well-being, physical activity strength, mental healthcare stimulation, happiness, and achievement through learning and friendships, and healthy living is linked to good ageing (Osis et al., 2015; Moore, 2020). The more difficult question is why so few people participated in LLL events. According to the “International Comparison Survey of the Daily Life and Attitudes of Elderly Persons” (2005), the actual average rate of LLL participation was significantly lower than the total number of participants. For example, Japan (12.4%), USA (14%), Korea (12.6%), Germany (19.6%), France (13.8%). Another report shows that the actual EU average rate related to participation in LLL processes (8.9%) is still very low compared to the target for 2020 (15%) (Bal, 2020; Saha, 2020; Choi & Cho, 2021; Akther, 2020). Among those, the countries with the most unfavorable position, i.e., values well below the actual European average (e.g., Greece, Hungary, Romania, and Bulgaria) (Muresan, 2014). Reviews emphasize the challenges of LLL, which are classified and further discussed in three themes: poor readiness, institutional barriers, and unbalanced policies.

No doubt, lifelong learning (LLL) is a key element of the conceptual framework of active aging (Jarvis, 2004). Active ageing is recognized as the process of optimizing opportunities for healthcare, well-being, independence, and contributing to an enriched quality of life as people age (Barbabella et al., 2022). Despite the concept's increasing acceptance around the world due to a fast-growing elderly population, reviews have garnered a variety of criticisms and debate on both a theoretical and practical level (Fusco et al., 2020). While some participants advocated for an immediate increase in pension and welfare costs due to demographic ageing and the associated costs, others advocate for increased employment participation, a productivity interpretation that focuses on increasing employment levels at all ages in order to maintain economic nations (Carmel et al., 2007). This necessitates a manual comprehension of lifelong learning.

Furthermore, because they have control over their own lives, their own ageing process should not be pushed towards specific normative or model ageing (Keto-Timonen et al., 2016). However, because the ageing population has an impact on all aspects of human life, including social, economic, cultural, and political domains, the LLL orientation of encouraging adult learning and continuing education to adapt to current social-economic demands with enlarging changing by technological advances impact (Boulton-Lewis, 2010; Benavot et al., 2022). It is necessary to ensure individuals, communities, and nations achieve sustainable development goals. When all countries face rising environmental, social, and economic threats, the role of the ageing population is always

acknowledged, but the most effective policies are those that reject a top-down approach and respect the elderly's agency rights (Falanga et al., 2020).

Why, how, and what adults need to keep learning throughout their lives is a question that has sparked a lot of debate in both theory and practice (McFarland, 2017). Many extant ideas explain adult learners' abilities as a critical aspect in their continuing to improve their quality of life. The transformational learning theory, for example, explains how people's viewpoints change as they adapt to the demands of the world (Slavich & Zimbardo, 2012). Adult learners adopt a shift in mindfulness and practice to adapt to changing requirements with new information (Aedo et al., 2017).

In light of the global trend toward population ageing, education systems face increasing pressure to adapt and support lifelong learning pathways for older adults (World Health Organization, 2015). Lifelong learning is not merely a social or policy intervention; it is fundamentally an educational imperative (Dave, 2014). Adult education, especially in later life, plays a critical role in fostering cognitive vitality, social inclusion, and adaptability in rapidly changing societies (Yadav et al., 2024). This aligns with the core mission of educational institutions to promote learning across the lifespan. Consequently, the present study situates its analysis within the educational domain by examining how adult learning theories (e.g., andragogy and cybergogy), programmatic innovations, and institutional practices contribute to enhancing active aging (Merriam & Baumgartner, 2020). By doing so, the research not only addresses a demographic and social challenge but also responds to a pedagogical call for inclusive, learner-centered education throughout all stages of life.

Individual elders are learning about digital banking. For example, may notice a shift in how they view and practice in the present life with digital technology support, as this is a new norm that they did not learn before in their previous life (Laurence, 2021). Malcolm Knowles, an expert in andragogy, stated that when adults desire to develop their knowledge and abilities for a new career, they can direct their learning through their experiences (Knowles et al., 2014). Adult learners are problem-solvers who are eager to learn how to construct new information for themselves (Boulton-Lewis, 2010). Adults learn without the intervention of outside factors under self-directed theories, which are built on self-confidence, drive, and independence (Boyer et al., 2013).

In reality, lifelong learning programs have proven effective in aging countries, such as Japan, Italy, Finland, Germany, France, and several others, where the population aged 65 and over makes up a significant proportion (OECD, 2019; UNESCO, 2020). Economic instability, financial issues, pressure on employment markets, and depopulation of rural areas are only a few of the challenges that ageing countries face (Chand & Tung, 2014). As a result, lifelong learning programmes in healthcare improve both physical and mental health, encourage job retention in the older workforce, and are frequently linked to increasing productivity in order to preserve work employability and economic purpose (Formosa, 2014). However, multiple studies have found that the challenges of LLL in policies and practices are appealing, and that solutions for improving LLL results are needed.

Through the study question:

1. What are the challenges for elders participating in lifelong learning activities?
2. What does this systematic review reveal about the challenges of Lifelong Learning and the innovative trends for active aging?

2. Methodology

2.1. Data Selection Process

This study extracted data from the Scopus database, one of the most comprehensive global academic databases (Baas et al., 2020). The data was collected in January 5th, 2025. The authors conducted a series of Boolean searches on the Scopus database as following keywords: "TITLE-ABS-

KEY ("lifelong learning" AND "active ag?ing" OR (elder* OR senior* OR "older adult*") AND (educat* OR teach* OR learn*)) AND PUBYEAR > 2001 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE , "English"))". The query included the terms “lifelong learning” and “active ag?ing” (to capture both “aging” and “ageing”), and was broadened with related expressions such as “elder*,” “senior*,” and “older adult*” to refer to older populations. These were combined with educational terms like “educat*,” “learn*,” and “teach*” to ensure the search focused on learning contexts relevant to aging. Data is also limited on document types: Articles, Conferences and Book Chapters. This search structure yielded 744 publications (referred to as primary data, raw data) from 2002 – 2024. Check the titles and abstracts of the selected papers closely, removing any that don't relate to lifelong learning for active aging. Specific requirements must be satisfied by the papers, such as including precise information on "lifelong learning" and "active aging" or their synonyms in the abstract, keywords, or title. Additionally, the articles must be read in their entirety if these sections do not provide the necessary information. Some author keywords did not include these terms but had content closely related to the research objectives and were retained, resulting in 673 articles (primary data) related to the research issue. Titles and abstracts were further filtered to retain publications most closely related to the research issue, teaching, and learning in lifelong learning, resulting in 498 publications (secondary data, analytical data). The processed data was then analyzed using two tools: VOS Viewer and Biblioshiny.

2.2. Data Analysis

To analyze the retrieved bibliographic dataset, this study employed a combination of quantitative bibliometric techniques and visual mapping tools. The objective was to explore not only the volume and distribution of publications related to lifelong learning (LLL) for active aging but also to uncover conceptual structures, collaborative patterns, and emerging research trends within the field.

Two software platforms were used: VOSviewer (version 1.6.19) and Biblioshiny, the web-based interface for the R package Bibliometrix. These tools were selected for their robustness, ease of visualization, and widespread academic acceptance in bibliometric research.

The analysis was structured into several interrelated stages:

First, descriptive statistical analysis was conducted using Biblioshiny. This step quantified key publication metrics including annual growth rate, average citations per document, author productivity, source impact, and the distribution of publications by country and institution. These indicators helped assess the maturity and academic engagement within the LLL-active aging domain.

Second, keyword analysis was performed to identify the most frequently used author keywords and Keywords Plus. Keyword co-occurrence mapping, generated via VOSviewer, enabled the identification of major research themes and clusters. This helped reveal which subtopics (e.g., digital inclusion, intergenerational learning, motivation) were most prevalent and how they were thematically interconnected.

Third, co-authorship and co-citation analyses were carried out to examine the intellectual and social structure of the field. Co-authorship mapping illustrated patterns of collaboration among researchers and institutions, including the degree of international cooperation. Co-citation analysis identified the most influential works, journals, and authors by evaluating how often they were cited together, reflecting their foundational role in shaping the field.

Finally, a temporal trend analysis was applied to visualize the evolution of publication output and citation impact over time. This allowed for the identification of critical periods of growth or stagnation and helped contextualize the influence of global events (e.g., the COVID-19 pandemic) on the research agenda.

Together, these analyses provided a comprehensive and multi-dimensional view of the research landscape on lifelong learning for active aging, supporting the study's aim of identifying both historical foundations and innovative directions in the field.

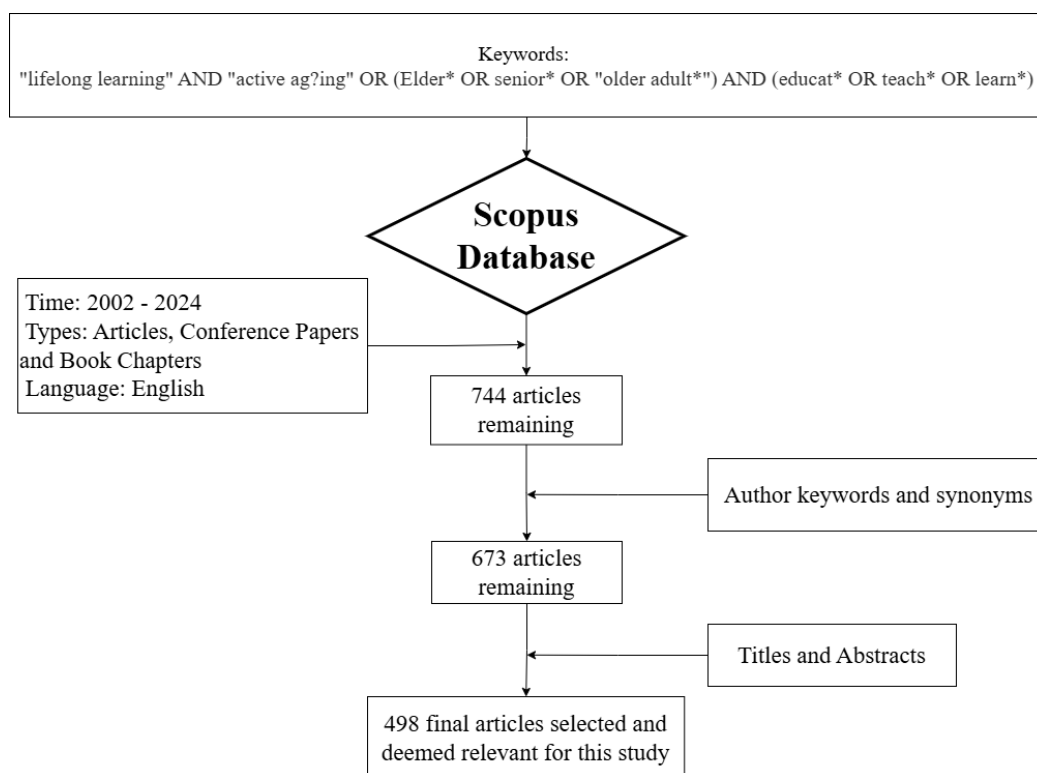


Figure 1. Data Analysis Process

3. Results

The bibliometric attributes of documents concerning lifelong learning (LLL) for active aging, as recorded in Scopus between 2002 and 2024, offer an insightful glimpse into the maturity, growth, and collaboration patterns of the field.

Table 1. Table Styles Available in the Word Template

Attribute	Number or magnitude
Sources	312
Documents	498
Annual growth rate	16.81%
Average age of documents	7.95
Mean citations per document	11.14
References	17577
Keywords Plus (ID)	1685
Author's keywords (DE)	1223
Authors	1211
Single authors documents (with no co-author)	132
Co-authored per document	2.77
International co-authorships	15.86%

The dataset reveals a total of 498 documents published across 312 distinct sources. The diversity of sources highlights the interdisciplinary nature of LLL and aging, encompassing education, gerontology, public health, and technology.

The annual growth rate of publications is recorded at 16.81%, reflecting a steady increase in academic attention. This number is comparable to similar maturing subfields of education and technology-enhanced learning. It suggests a healthy and expanding body of research rather than one driven by temporary trends.

The average age of documents is approximately 7.95 years, indicating a relatively mature field that has grown significantly since its inception in the early 2000s. Coupled with a mean citation count of 11.14 per document, this shows a solid level of scholarly engagement, though with room for deeper citation impact as the field gains greater maturity and cross-disciplinary relevance.

The total number of references across all documents is 17,577, demonstrating the field's integrative capacity and its reliance on a wide body of pre-existing knowledge. With 1,685 Keywords Plus and 1,223 author-defined keywords, the thematic range is both vast and rich. This diversity suggests numerous sub-topics (e.g., digital inclusion, intergenerational learning, active aging policies), which could be further clustered using co-word analysis.

The field comprises 1,211 authors, with 132 documents written by single authors, reflecting a collaborative tendency. The average number of authors per document (co-authorship rate) is 2.77, which aligns with global norms for social science and educational research. Notably, 15.86% of the documents involve international collaboration, a significant indicator of the field's global relevance and engagement. This level of international collaboration can be seen as both a strength and a point for future growth. Compared to more established domains with collaboration rates of 25–30%, there is still potential to enhance global partnerships, particularly in underrepresented regions.

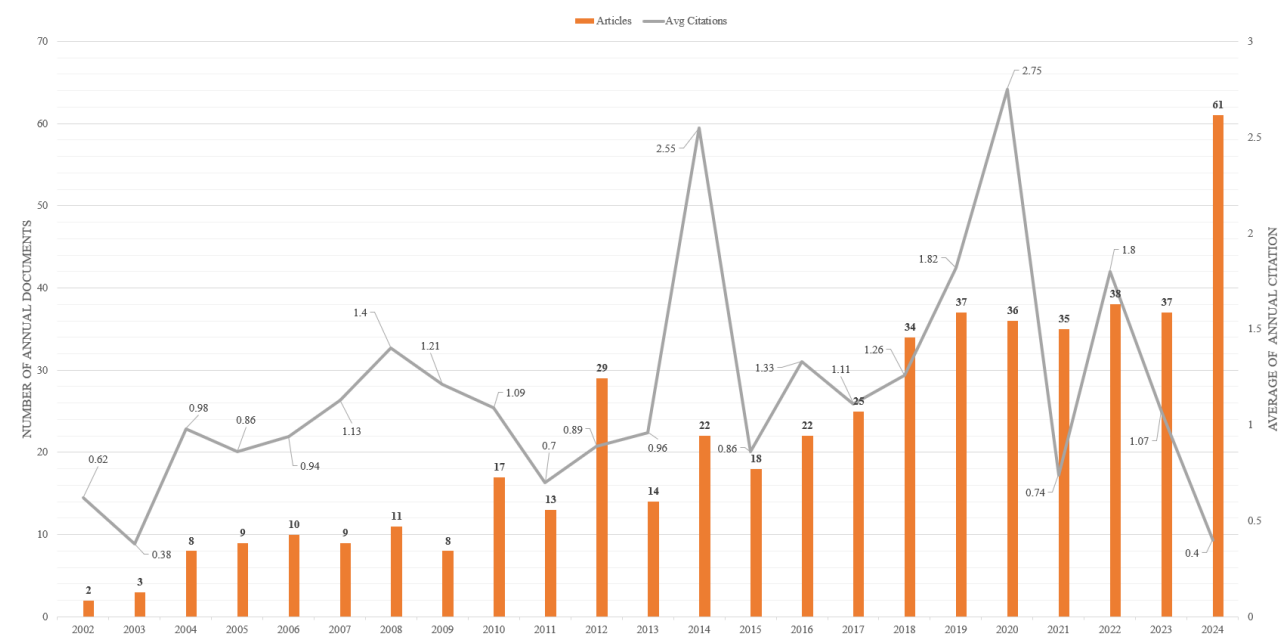


Figure 2. Change in the Number of Publications and Average Citations Per Years on Lifelong Learning for Active Aging Published in Scopus from 2002 to 2024

The figure showcasing changes in publication output and average citation rates over the 22-year period from 2002 to 2024 highlights critical developmental phases of the field. In the early years (2002–2008), publication numbers remained relatively low and stable, indicating a nascent stage with foundational studies likely focusing on theoretical frameworks or pilot programs in adult education.

A steady rise from 2010 onwards likely reflects an increasing recognition of demographic changes (i.e., aging populations) and the role of education in enhancing the quality of life for older adults. The most notable surge in publications appears post-2015, with a peak possibly occurring around the COVID-19 pandemic era. The increased interest during this time can be attributed to the heightened urgency of digital inclusion for older adults and the critical need for social connectivity, which lifelong learning can help facilitate.

Early publications maintain relatively higher citation averages, reflecting the foundational or landmark nature of these works. Newer publications, especially those post-2020, may show fewer citations not due to lower quality but rather due to limited exposure time (citation latency). The average citation trends indicate a healthy level of academic engagement, with certain spikes likely tied to high-impact review articles or policy-relevant research during global aging-related policy shifts.

This dual trend of increasing volume and gradual citation normalization is typical of growing research areas where quantity initially outpaces influence but eventually converges.

Table 2. Top 10 Countries Ranked by the Number of Contributions Lifelong Learning for Active Aging Published by Them and by Citations of Those Contributions

Rank	Country or territory	Total publications	Share in total (%)	Total citations	Citation rank
1	United States	134	26.9	1771	1
2	United Kingdom	46	9.2	540	2
3	Spain	30	6.0	514	3
4	China	28	5.6	62	22
5	Hong Kong	26	5.2	197	10
6	Canada	25	5.0	477	4
7	Australia	19	3.8	278	6
8	Taiwan	19	3.8	275	7
9	Japan	17	3.4	147	12
10	Sweden	17	3.4	193	11

This table identifies the leading countries contributing to the research on lifelong learning (LLL) for active aging. The United States leads with 134 publications (26.9% of the total) and ranks first in citations (1771), demonstrating both high productivity and scholarly impact. The dominance of the US is consistent with its global leadership in gerontological and educational research.

The United Kingdom and Spain follow with 46 and 30 publications respectively, also ranking second and third in citation count (540 and 514). These figures indicate that Western countries, particularly in North America and Europe, are primary hubs for this research. Their strong performance may be attributed to advanced aging populations, institutional support for lifelong learning, and strong public policy focus on healthy aging.

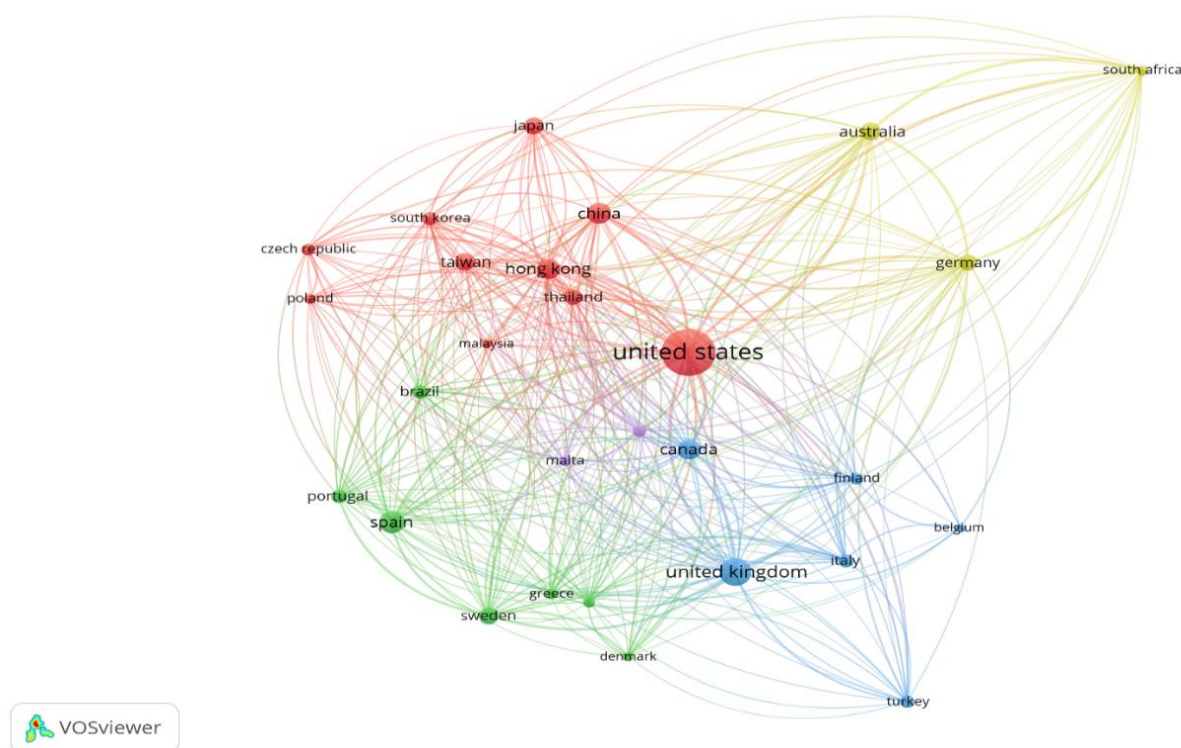
Notably, China, despite ranking fourth in publication volume (28 papers), ranks only 22nd in citations (62 total). The low citation performance of Chinese publications may be due to limited

international visibility caused by language barriers and local publishing channels, as well as the focus on domestic policy issues that attract less global academic attention. Many studies are relatively recent, so they have not yet had sufficient time to accumulate citations.

In contrast, countries like Canada, Australia, and Taiwan maintain relatively balanced positions between publication volume and citation impact, indicating consistent scholarly contributions that are recognized internationally. This may be attributed to well-established research infrastructures, strong academic networks, and policies that support aging and lifelong learning. Japan and Sweden, despite contributing a modest number of publications, show stable citation performance. Their output may reflect specialized or niche research focuses that resonate within certain academic subfields rather than broad, high-volume impact.

The presence of countries such as Hong Kong and Taiwan among the top 10 highlights growing interest in LLL and aging in Asian contexts. These regions may serve as case studies for how cultural and demographic factors shape aging policies and educational opportunities.

This geographic profile shows that while LLL for active aging is a global concern, much of the academic leadership still stems from a few high-income regions. For the field to advance equitably, greater participation and visibility of research from the Global South should be encouraged.



Note. The size of the circle is proportional to the number of research publications from that country (Table above).

Figure 3. Network of Countries Participating in Collaborative Research on LLL for Active Aging

This network diagram maps the relationships among countries based on co-authored publications. The size of each circle represents the number of publications, and the links indicate international collaborations.

The United States, United Kingdom, and Spain appear as central nodes with multiple connections, suggesting their frequent role as hubs in international research teams. Countries like Canada, Australia, and Japan also show significant international linkages, aligning with their strong citation and publication performance noted earlier. Hong Kong and Taiwan, while regionally

important contributors, show fewer collaborations, potentially indicating regional self-containment or underreported partnerships.

The visualization reveals a core-periphery structure: Core countries (US, UK, Spain) serve as anchors in multi-country projects. Peripheral nodes (e.g., Sweden, China) may either have fewer overall publications or tend to publish domestically. The clustering patterns suggest the emergence of regional sub-networks (Europe, East Asia, and Anglophone countries) form distinguishable collaborative zones.

International collaboration is essential to ensure the exchange of culturally contextual insights and policy innovations. The current network, while promising, could benefit from broader inclusion, particularly from Latin America, Africa, and Southeast Asia. Enhanced multilateral cooperation could facilitate knowledge transfer and global implementation of successful lifelong learning models for older populations.

Table 3. Top 9 Sources Ranked by the Output Published by Them on Lifelong Learning for Active Aging Published in Scopus from 2002 to 2024

Rank	Source	Total publications	Total citations
1	<i>Educational Gerontology</i>	37	724
2	<i>International Journal of Lifelong Education</i>	20	265
3	<i>ASEE Annual Conference and Exposition, Conference Proceedings</i>	12	29
4	<i>Gerontology and Geriatrics Education</i>	11	158
5	<i>Education in the Asia-Pacific Region</i>	7	8
6	<i>Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)</i>	7	2
7	<i>Lifelong Learning Book Series</i>	7	15
8	<i>Journal of Intergenerational Relationships</i>	6	96
9	<i>International Journal of Environmental Research and Public Health</i>	5	57

Note: Author’s analysis of Biblioshiny

This table outlines the journals and conference proceedings most active in publishing research on LLL for active aging. *Educational Gerontology* stands out as the top publishing source with 37 articles and 724 citations, underscoring its role as a disciplinary anchor for this field. The *International Journal of Lifelong Education* and *Gerontology and Geriatrics Education* also show strong contributions, reflecting the interdisciplinary overlap between education and aging studies. Interestingly, some conference proceedings (e.g., *ASEE Conference*) have a high publication count but relatively low citations, suggesting their content may serve as early-stage dissemination rather than long-term scholarly references.

Sources such as *the Journal of Intergenerational Relationships* and the *International Journal of Environmental Research and Public Health* provide complementary perspectives, addressing both

social inclusion and health promotion, which are key to active aging. This ranking serves as a useful guide for future researchers in identifying impactful and receptive publication venues. It also emphasizes the need for open access and international journals to attract diverse authors and promote equitable dissemination.

Table 4. Top 7 Authors Ranked by the Number of Publications Lifelong Learning for Active Aging Published in Scopus from 2002 to 2024

Rank	Author	Affiliation	Total publications	Total citations	Total citations/total publications
1	Tam, Maureen	The Education University of Hong Kong, Hong Kong	11	66	6
2	Findsen, Brian	University of Waikato, New Zealand	10	24	2.4
3	Knopf, Richard C.	Arizona State University, USA	6	139	23.17
4	Talmage, Craig A.	Hobart & William Smith Colleges and Faculty Associate, Arizona State, USA	6	139	23.17
5	Formosa, Marvin	University of Malta, Malta	6	82	13.67
6	Brady, E. Michael	University of Southern Maine, USA	5	96	19.2
7	Yamashita, Takashi	University of Maryland, Baltimore County, USA	5	72	14.4

Note: Author's analysis of Biblioshiny

This table lists seven leading authors in the field by number of publications and citations. Tam Maureen (Hong Kong) and Brian Findsen (New Zealand) top the list with 11 and 10 publications respectively, establishing themselves as key voices in Asian and Pacific lifelong learning contexts.

Authors such as Knopf and Talmage (USA) demonstrate exceptionally high citation-per-publication ratios (23.17), indicating their works are not only prolific but also highly influential. Similarly, Marvin Formosa (Malta) and Michael Brady (USA) show both productivity and consistent citation rates, suggesting established academic authority.

Given the geographic and institutional diversity, spanning the US, Hong Kong, Malta, and New Zealand, these authors are well-positioned to lead multi-country collaborative studies. Their work forms the intellectual backbone of the field and should be referenced in foundational reviews and meta-analyses.

Table 5. 10 Most Cited Papers Lifelong Learning for Active Aging Published in Scopus from 2002 to 2024 and the Section of the Paper That was Cited

Rank	Title of the publication	Authors and year	Published in	Total citations	Citations per year
1	The Myth of Cognitive Decline: Non-Linear Dynamics of Lifelong Learning	Ramscar, M. et al (2014)	<i>Topics in Cognitive Science</i>	249	20.75
2	When Going Digital Becomes a Necessity: Ensuring Older Adults' Needs for Information, Services, and Social Inclusion During COVID-19	Xie, B. et al (2020)	<i>Journal of Aging & Social Policy</i>	218	36.33
3	How family support and Internet self-efficacy influence the effects of e-learning among higher aged adults – Analyses of gender and age differences	Chu, R. J. C. (2010)	<i>Computers & Education</i>	157	9.81
4	Promoting Community Wellbeing: The Case for Lifelong Learning for Older Adults	Merriam, S. B., & Kee, Y. (2014)	<i>Adult Education Quarterly</i>	150	12.50
5	Motivations for learning among older adults in a learning in retirement institute	Kim, A., & Merriam, S. B. (2004)	<i>Educational Gerontology</i>	138	6.27
6	Social and economic factors and malnutrition or the risk of malnutrition in the elderly: A systematic review and meta-analysis of observational studies	Besora0-Moreno, M. et al (2020)	<i>Nutrients</i>	136	22.67
7	Lifelong learning in active ageing discourse: its conserving effect on wellbeing, health and vulnerability	Narushima, M. et al (2016)	<i>Ageing and Society</i>	133	16.63
8	Mechanical Muscle Function, Morphology, and Fiber Type in Lifelong Trained Elderly	Aagaard, P. et al (2007)	<i>Medicine & Science in Sports & Exercise</i>	127	6.68
9	Psychological Barriers to Digital Living in Older Adults: Computer Anxiety as Predictive Mechanism for Technophobia	Di Giacomo, D. et al (2019)	<i>Behavioral Sciences</i>	76	10.86
10	The effects of learning on wellbeing for older adults in England	Jenkins, A., & Mostafa, T. (2014)	<i>Ageing and Society</i>	76	6.91

The top-cited paper, “The Myth of Cognitive Decline” by Ramscar et al. (2014), with 249 citations, reflects the cognitive science perspective's influence on aging discourses. Its average citation rate of 20.75 per year confirms its status as a seminal text.

Xie et al. (2020), discussing digital inclusion during COVID-19, is especially relevant with 218 citations and an exceptionally high citation rate (36.33/year), highlighting timely and policy-relevant contributions.

Other high-ranking papers (e.g., Chu 2010, Merriam & Kee 2014, Kim & Merriam 2004) emphasize the social and motivational dynamics of older adults in learning, aligning with foundational theories of adult education.

Topics range from cognitive neuroscience to community well-being, from digital literacy to nutritional studies, showcasing the field's interdisciplinarity. Notably, papers published in journals like *Topics in Cognitive Science*, *Computers & Education*, and *Nutrients* reveal the diverse academic homes of impactful work.

These papers serve as critical references for future work. Their methodologies, populations, and conceptual frameworks should be replicated or built upon in longitudinal studies. Their enduring impact also reinforces the importance of addressing aging in non-traditional educational disciplines.

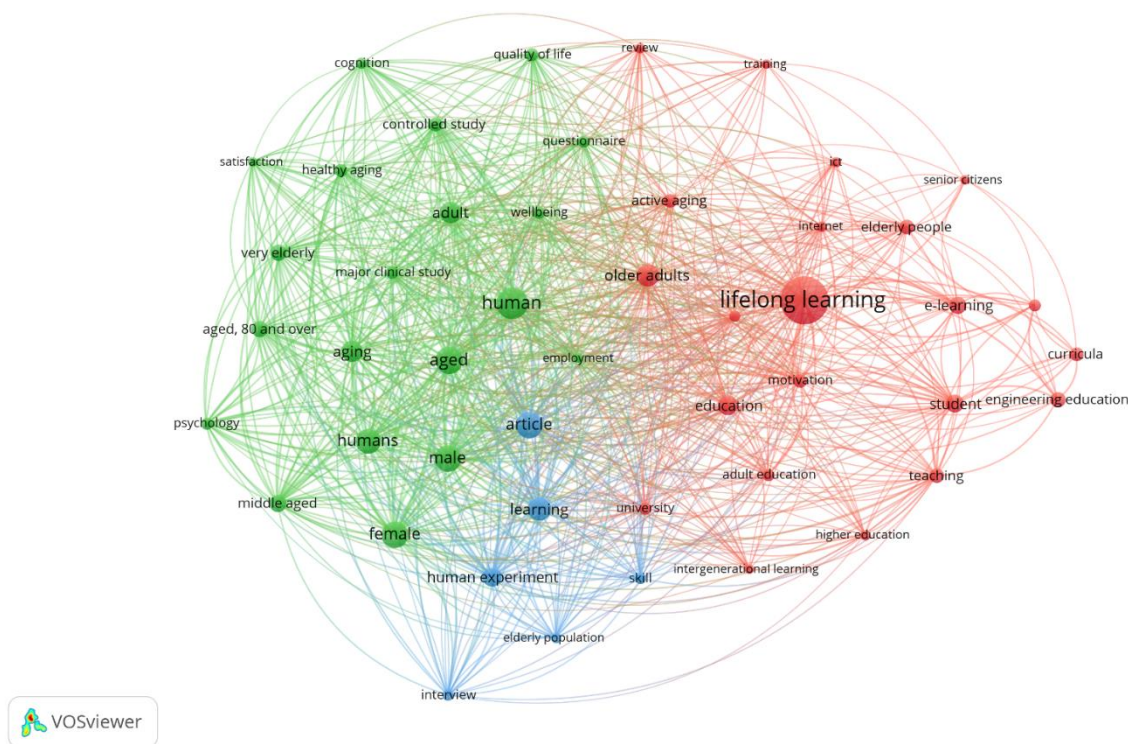


Figure 4. Network of Keywords - Based on Their Co-Occurrence - Most Frequently Used in Publications on Lifelong Learning for Active Aging Published in Scopus from 2002 to 2024

The keyword network visualization maps the conceptual structure of the field. Central keywords such as "lifelong learning", "active aging", "digital literacy", and "older adults" form the backbone of the discourse. Their co-occurrence suggests frequent thematic linkage in scholarly work.

Peripheral clusters may include terms like "social inclusion", "wellbeing", "COVID-19", "geragogy", and "intergenerational learning", reflecting emerging or specialized research areas.

The close proximity of digital terms with health and psychological constructs (e.g., "cognitive health", "digital divide") highlights the merging of technology and health in LLL frameworks. This reinforces the growing emphasis on digital equity and accessibility.

Analyzing keyword frequency and clustering aids in identifying gaps in the literature. Underrepresented areas, such as “equity”, “policy implementation”, or “developing countries”, could form the basis of future focused research. This map is not just reflective but also predictive of evolving scholarly attention.

4. Discussion

Lifelong learning (LLL) has become essential in addressing the challenges of an aging population. One persistent obstacle is the lack of motivation among older adults (SCHUTZER, 2004). Although LLL is widely acknowledged for its benefits, such as improved well-being, social engagement and economic participation, many seniors still hesitate to join learning programs (Roberson, 2005). This reluctance stems from various factors, including doubts about the usefulness of the content, lack of confidence in learning new skills, and the absence of immediate benefits (Boulton-Lewis, 2010).

In a fast-changing digital world, the ability to learn and adapt has become a basic and vital skill (Abuhassna et al., 2022). Adult learners’ previous life and learning experiences shape their motivation and engagement in the learning process (Surdick et al., 2021). From a personal perspective, self-learning contributes to the development of self-awareness, autonomy, and emotional growth (Sagitova, 2014), while also supporting social advancement (Stoliarchuk et al., 2024).

This has led to the rise of andragogy, an adult learning theory that emphasizes self-direction and goal-oriented learning environments. It encourages learners to make their own choices and pursue personal development paths (Muneja, 2017). Andragogical principles have been applied in blended and online learning to enhance self-learning capacity (Barabanova et al., 2020). Educational content has also become more practical and personalized, addressing real-life challenges such as adapting to new technologies, managing health, or digital financial literacy (Abuhassna et al., 2022).

However, the implementation of andragogy varies by country. In the U.S., it is widely adopted and seen as both a theory and a practical framework for adult education, while in Europe, it remains largely a theoretical discussion (Kobylarek, 2025).

At the same time, the rise of cybergogy has introduced digital learning environments that promote both independent and collaborative learning. These environments offer diverse resources such as structured materials, self-assessments, and online discussions (Muresan, 2014; Reigeluth, 2013). Cybergogy helps learners achieve learning outcomes through digital tools and enhances flexibility in how, when, and where learning occurs.

Combining andragogy and cybergogy presents a promising model for lifelong learning, especially for older adults. Promoting informal learning and a culture of self-development could further encourage participation. However, barriers remain. Many institutions are not adequately equipped to meet older learners’ needs, and traditional teaching methods often fail to support their learning preferences (Asrifan et al., 2025). Policy gaps across countries also result in uneven access to lifelong learning, especially for those from lower-income backgrounds (OECD, 2018).

4.1. Limitations

While this study offers valuable insights into the landscape of lifelong learning (LLL) for active aging through a bibliometric lens, it is not without limitations. First, the scarcity of publications explicitly using the term “*active aging*” posed a significant challenge. To ensure a comprehensive review, the research team had to expand the search scope to include various synonyms and conceptually related terms, which increased the manual workload and may have introduced a degree of subjectivity in article selection.

Second, although the study employed rigorous bibliometric tools (VOSviewer and Biblioshiny), the analysis was limited to publications indexed in the Scopus database. Relevant contributions found

in other databases (e.g., Web of Science, PubMed) or gray literature may have been excluded, potentially narrowing the representativeness of the results.

Third, bibliometric analysis primarily reveals structural and thematic trends but does not allow for an in-depth examination of the contextual quality or effectiveness of LLL interventions. As such, the study does not assess the practical outcomes or impact of LLL policies and programs on older adults in specific regional or cultural settings.

Finally, despite identifying global trends, the study reveals a dominance of publications from high-income countries. As a result, the perspectives and challenges of lifelong learning in low- and middle-income regions remain underrepresented, suggesting a need for future research that embraces more diverse socio-economic and cultural contexts.

5. Conclusion

In response to the global challenges posed by population ageing, lifelong learning (LLL) has emerged as a pivotal strategy for fostering individual development, social inclusion, and economic sustainability. While LLL is frequently recognized as a key driver of active ageing, its broader contributions encompass improvements in healthcare outcomes, workforce adaptability, and civic engagement. Despite these benefits, implementation remains uneven due to systemic barriers, institutional limitations, and policy fragmentation.

This study highlights the evolving landscape of motivational strategies, institutional programme reforms, and shifts in the andragogical approaches underpinning LLL. The findings suggest that individuals who engage in continuous learning are more likely to sustain employability, enhance personal well-being, and contribute meaningfully to society over an extended lifespan.

Furthermore, when supported by inclusive labour market policies and community-based initiatives, LLL frameworks can facilitate older adults' integration into social and economic systems. Such policies not only advance individual capabilities but also strengthen social cohesion and economic resilience in ageing societies. Ultimately, the development and refinement of LLL strategies will play a critical role in addressing the demographic transformations of the 21st century.

6. Suggestion

6.1. *Innovational Trends in Lifelong Learning*

Faced with these challenges, several innovative trends in LLL have emerged. One such prominent initiative includes the adoption of the Innovational Andragogy Paradigm Approach, which centrally focuses on adult learners in the whole educational process. This approach respects the unique needs and forms of older adult learning. It puts much emphasis on those areas that provide practical relevance by integrating technology with innovative forms of teaching. This paradigm promotes the development of LLL programs (Muneja, 2017). Any learner needs an environment for learning that encourages critical thinking and originality, which itself fosters active participation.

Another critical trend involves the integration of information and communication technology into LLL. ICT allows for self-paced and collaborative learning through digital platforms, making it convenient and flexible for older adults to learn. In this regard, a very effective "cybergogy" paradigm has managed to connect the traditional and digital learning environments by engaging older learners effectively with structured resources and self-assessment tools and also through forums on the discussion of issues (Muresan, 2014). This paradigm enhances the learning experience and contributes toward developing digital literacy, a skill that is most required in this age of digitization.

Promoting a culture of lifelong learning is critically important to engage seniors and older adults in LLL activities. Recognizing the value of informal learning experiences, facilitating critical community

environments, and building various support structures can raise participation rates dramatically. Programs and activities from the community that focus on social bonding are firmly used to establish opportunities for real-life learning (Thang et al., 2019).

6.2. Implications for Policy and Practice

Given these findings, the present paper tries to underline comprehensive and inclusive lifelong learning approaches to active aging. Policymakers must pay attention to the motivational and institutional barriers impeding participation by older persons in LLL activities. This should also entail targeted outreach programs, offering incentives, or flexible learning pathways that would accommodate diversity among needs for the older learner category.

The revision of the curriculum and instructions in educational institutions is necessary to be more suitable for older adult students. That is to say, it involves adopting the innovative andragogy Paradigm Approach and integrating ICT into learning programs, which creates an engaging, supportive, and encouraging environment for lifelong learning.

The creation of a culture of lifelong learning, however, requires combined efforts from policymakers, educators, and community organizations. In this context, programs focused on social engagement and the valorization of informal learning would be essential solutions for motivating senior citizens to participate in LLL activities. Programs at the community level that offer practical learning experiences and foster social connections are particularly successful in doing so (Falanga et al., 2020).

Declarations

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Ethical Approval. Data for this quantitative study were collected through anonymous surveys, and the personal information of the participants was not collected. Additionally, the consent of instructors and students was granted before the data collection process.

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