Artificial Intelligence in Autism Spectrum Disorder: Emerging Research Trends and Future Directions

Richard Rickie Akat, Suziyani Mohamed, and Nurul Khairani Ismail

Abstract **– Artificial intelligence (AI) has been increasingly applied in autism spectrum disorder (ASD), particularly in early detection, behavioural analysis, and intervention development. However, a comprehensive understanding of research trends in this field remains limited. This study examines global trends in AI–ASD research using a bibliometric approach. A total of 1,007 Scopus-indexed publications were analysed to identify publication patterns, leading contributors, and thematic structures. The results show a steady increase in research output, with a marked acceleration after 2015, largely driven by technologically advanced countries. Keyword analysis indicates a strong concentration on machine learning, classification models, and diagnostic applications, suggesting that the field remains primarily technical and clinically oriented. In contrast, educational and socioemotional applications remain significantly underrepresented, indicating a critical gap in the translation of AI into real-world classroom contexts. These findings highlight the need for stronger integration between artificial intelligence, educational sciences, and developmental frameworks to support more holistic and inclusive outcomes for children with ASD.**

Keywords **– Artificial Intelligence, Autism Spectrum Disorder, Bibliometric Analysis, Socioemotional Skills, Research Trends**

I. INTRODUCTION

Artificial intelligence (AI) has transformed research and practice in autism spectrum disorder (ASD), particularly in early detection, behavioural analysis, and intervention development. Advances in machine learning and data-driven modelling have improved the identification of ASD-related characteristics and the prediction of developmental outcomes (Alqaysi et al., 2022; De Giacomo et al., 2026).

AI is increasingly applied in education, enabling adaptive learning, intelligent assessment, and personalised instructional support (Chiu et al., 2023; Gadzhimusieva et al., 2026; Wang et al., 2024; Zhai et al., 2021). However, AI–ASD research remains predominantly focused on technical and diagnostic applications, with limited attention to educational and socioemotional contexts (Kotsi et al., 2025; Mukhtarkyzy et al., 2025).

This imbalance reflects a broader misalignment between technological innovation and pedagogical needs (Zawacki-Richter et al., 2019). This misalignment limits the practical relevance of AI–ASD research, particularly in addressing real educational and developmental needs. Rather than being guided by educational priorities, AI–ASD research continues to be shaped primarily by advances in computational methods. As a result, the potential of AI to support meaningful learning and developmental outcomes remains underexplored.

This study therefore examines global trends in AI–ASD research using a bibliometric approach. In doing so, it identifies dominant patterns of knowledge production and highlights areas requiring greater integration with educational and socioemotional frameworks. By focusing on these dimensions, the study contributes to a more balanced understanding of the field beyond technical and diagnostic applications. It also highlights a structural imbalance, particularly the limited integration of artificial intelligence within educational and developmental contexts, with implications for future research and practice.

Specifically, this study addresses the following research questions:

1) What are the publication trends in AI–ASD research over time?
2) Who are the most productive and influential authors, countries, institutions, and source titles in AI–ASD research?
3) Which documents have the greatest scientific impact based on citation indicators?
4) What are the dominant research themes based on author keyword (DE) co-occurrence analysis?

II. PROBLEM STATEMENT

Although AI has demonstrated significant potential in ASD, its application remains largely concentrated in technical and diagnostic domains, with limited translation into educational contexts. Existing research predominantly focuses on machine learning algorithms and predictive models for diagnosis, often relying on structured datasets such as neuroimaging and behavioural assessments (Ahmed et al., 2025; Muñoz-Terol et al., 2026).

However, this focus does not adequately address the broader developmental needs of individuals with ASD, particularly socioemotional competencies, which are critical predictors of long-term educational, social, and psychological outcomes (Cipriano et al., 2023; Kim et al., 2024; Piñeiro-Dosil et al., 2026).

Furthermore, challenges such as limited data generalisability, dataset bias, and the heterogeneity of ASD constrain the development of standardised and widely applicable AI models, particularly for early diagnosis and intervention (Ahmed et al., 2025; De Giacomo et al., 2026).

These issues highlight a critical gap between technological advancement and its meaningful application in educational practice. Consequently, a systematic examination of the AI–ASD research landscape is needed to identify dominant trends and underexplored areas, particularly in educational and socioemotional domains. Without greater alignment with educational contexts, the

Richard Rickie Akat, Universiti Kebangsaan Malaysia, Malaysia (Email address: richardrickieakat@gmail.com).
Suziyani Mohamed, Universiti Kebangsaan Malaysia, Malaysia (Email address: suziyani@ukm.edu.my)
Nurul Khairani Ismail, Universiti Kebangsaan Malaysia, Malaysia (Email address: nkhairani@ukm.edu.my)

field risks producing technologically advanced solutions that remain underutilised in practice.

The following section examines this gap through a synthesis of existing literature.

III. LITERATURE REVIEW

Building on the identified gap, this section critically examines the current state of AI–ASD research, focusing on its dominant applications, limitations, and gaps in educational and socioemotional contexts.

AI Applications in ASD Research

AI is widely applied in ASD research, particularly in diagnosis, behavioural analysis, and intervention development. Machine learning (ML) and deep learning (DL) models are commonly used to identify ASD-related patterns across neuroimaging, behavioural, and clinical datasets (Alqaysi et al., 2022; De Giacomo et al., 2026). These approaches enable automated classification and prediction, often achieving high levels of diagnostic accuracy.

Recent studies show that integrating neuroimaging and multimodal data improves early detection of ASD traits (Gkintoni et al., 2025; Ramírez et al., 2026). AI-based methods are also used to analyse social behaviours such as eye gaze, emotional expression, and joint attention, offering more objective alternatives to traditional observational assessments (Sun et al., 2025).

Natural language processing, computer vision, and multimodal systems have expanded the scope of AI in ASD detection (Rubio-Martín et al., 2024). Some models integrate behavioural, genetic, and neurological data to produce more individualised diagnostic profiles (Varghese & Devasenapathy, 2026).

Despite these developments, most studies prioritise classification performance and diagnostic optimisation. Less attention is given to broader developmental and educational applications (Ahmed et al., 2025; Muñoz-Terol et al., 2026). This suggests that research priorities remain closely aligned with computational performance, with comparatively less emphasis on educational and developmental applicability.

Limitations of AI in ASD Research

Several factors limit the practical use of AI in ASD research. A major issue is data quality and representativeness (Mohammadi et al., 2025; Solek et al., 2025). Many models rely on geographically and demographically narrow datasets, which reduces generalisability (Ahmed et al., 2025). This is particularly problematic given the heterogeneity of ASD.

A further limitation is the reliance on clinical and laboratory-based data. While such data support-controlled modelling, they do not reflect the complexity of everyday environments. As a result, models developed under controlled conditions may not perform well in settings such as classrooms or early childhood centres.

In addition, most studies focus on diagnosis rather than intervention or developmental support. This limits the contribution of AI to long-term outcomes such as social participation, emotional regulation, and adaptive functioning. More broadly, technological development often proceeds without sufficient alignment with educational practice (Zawacki-Richter et al., 2019). Even where predictive performance is high, issues such as data bias, limited ecological validity, and a lack of longitudinal evaluation restrict real-world application (Cavus et al., 2021). Collectively, these limitations highlight a structural disconnect between AI development and its implementation in real-world educational and developmental contexts.

Educational and Socioemotional Gaps in AI–ASD Research

Socioemotional development is central to ASD intervention, particularly in early childhood, as deficits in emotional regulation, social communication, and emotion recognition affect children's functioning. These competencies are critical for long-term developmental, educational, and psychosocial outcomes, underscoring the need for early intervention (Jin et al., 2025; López-Bouzas et al., 2024; Vatou et al., 2026). Skills such as emotional regulation, social communication, empathy, and self-awareness are closely linked to long-term developmental outcomes (Blewitt et al., 2021; García-García et al., 2025; Hosokawa et al., 2024).

However, these areas receive limited attention in AI–ASD research. Most studies focus on detection and classification rather than classroom application or intervention design. Integration between AI research and established socioemotional learning frameworks also remains limited, resulting in tools that are not aligned with classroom practice or developmental goals (Gadzhimusieva et al., 2026). This issue is particularly relevant in early childhood education, where socioemotional skills support later learning and social participation (Arbués et al., 2025; Józsa et al., 2025; Nilfyr & Ewe, 2025).

Without integration into educational contexts, the contribution of AI to holistic development is limited. Recent reviews indicate that AI-based interventions primarily target communication and social interaction, with less attention to broader outcomes such as independence and daily functioning (Paglialunga & Melogno, 2025; Sánchez de las Heras et al., 2026). This pattern reflects a continued emphasis on technical development, with limited attention to pedagogical and developmental considerations. This indicates a disconnect between technological development and its application in educational practice.

IV. METHOD

Research Design and Data Source

This study employed a bibliometric research design to analyse global trends in AI–ASD research. Bibliometric methods are well suited for examining the structure, development, and thematic evolution of a research field through the quantitative analysis of publication data, enabling the identification of research trends, intellectual structures, and knowledge dynamics (Amiruddin et al., 2025; Kumar, 2025; Marzi et al., 2025; Öztürk et al., 2024).

Data were retrieved from the Scopus database due to its structured indexing, comprehensive coverage, and high-quality curation standards, which enhance the reliability of bibliometric data (Lim et al., 2024; Mukherjee et al., 2022). A total of 1,007 publications were included in the final dataset.

Data Search Strategy

The search strategy was designed to retrieve relevant publications on AI–ASD research from 2010 to 2026, providing longitudinal coverage of the field's development. To enhance conceptual precision, the search query was applied exclusively to the TITLE field, as presented in Table I. This approach reduces the inclusion of peripheral studies and ensures that selected publications explicitly focus on the core research domain, thereby improving the relevance and specificity of the dataset. This strategy prioritises precision over recall to ensure that only highly relevant studies are included.

The inclusion criteria were limited to journal articles and review papers published in English and indexed in Scopus. Conference papers, book chapters, editorials, and notes were excluded to ensure dataset quality and consistency. The retrieved records were subsequently screened to ensure direct relevance to both artificial intelligence and autism spectrum disorder. The screening and selection process followed a PRISMA-adapted framework, as illustrated in Figure 1.

TABLE I. THE SEARCH STRING AND KEYWORDS USED FOR QUERY

Database	Search string
Scopus	TITLE (("autism spectrum disorder" OR ASD OR "autism spectrum condition" OR ASC OR autism OR autistic* OR "pervasive developmental disorder") AND ("artificial intelligence" OR AI OR "machine learning" OR "deep learning" OR "neural network*" OR "natural language processing" OR "computer vision" OR "intelligent system*" OR "data mining")) AND PUBYEAR > 2009 AND PUBYEAR < 2027 AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (SRCTYPE , "j")) Date of access: March 24, 2026

Data Cleaning and Harmonisation

To ensure the accuracy and reliability of the bibliometric analysis, the retrieved dataset underwent systematic data cleaning and harmonisation using OpenRefine and biblioMagika. Data preprocessing is a critical step in bibliometric research, as inconsistencies in bibliographic metadata, including author names, affiliations, countries, and keywords, may lead to fragmented datasets and misleading analytical outcomes (Nowakowska, 2025).

OpenRefine was primarily used to standardise and refine author keywords by resolving spelling variations, synonyms, and formatting inconsistencies through its clustering and reconciliation functions (Ahmi, 2023). This process enhanced conceptual coherence and reduced redundancy in keyword representation.

In parallel, biblioMagika, an Excel-based bibliometric data cleaning tool, was employed to standardise author names and institutional affiliations, detect missing bibliographic fields, and verify records through linkage with Scopus metadata (Ahmi, 2024). The dataset exported in .csv format from Scopus was manually reviewed and structurally adjusted to improve data integrity.

Multiple-value fields were standardised, and delimiters were applied consistently during data splitting to maintain uniformity across bibliographic entries. Overall, the cleaning and harmonisation procedures enhanced dataset coherence, minimised semantic fragmentation, and strengthened the validity of performance analysis and science mapping. These procedures were completed prior to bibliometric analysis to support the robustness of network visualisation and performance metrics.

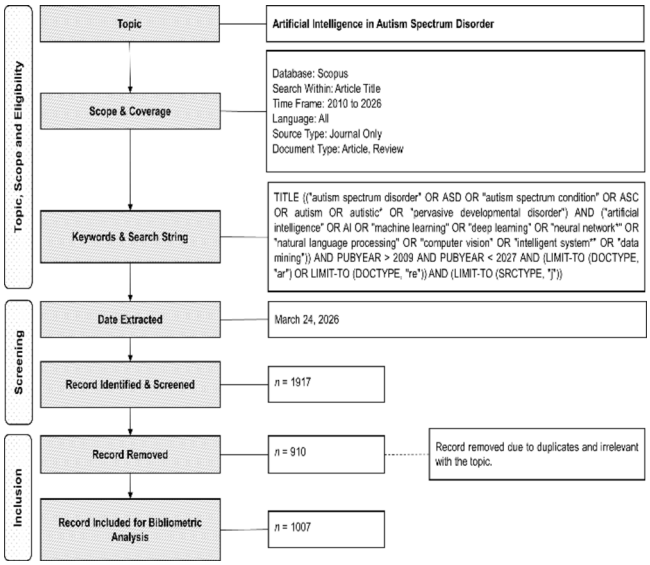


Figure 1. Flow diagram of the data search and screening process adapted from the PRISMA framework for bibliometric analysis.

Tools and Data Analysis

The bibliometric analysis in this study utilised a combination of specialised software tools. Microsoft Excel was used for preliminary data organisation and descriptive tabulation. Bibliometrix (R-package) and its web interface Biblioshiny (Aria & Cuccurullo, 2017) were employed to conduct performance analysis, including annual scientific production, most productive authors, countries, institutions, and citation indicators such as total citations and the h-index (Arruda et al., 2022).

Network analysis and visualisation were conducted using VOSviewer, with normalisation based on the association strength method. The association strength normalisation method was selected as it is widely used in bibliometric network analysis to standardise co-occurrence relationships. Author keywords (DE) were selected instead of index keywords, as they more accurately represent the core content and research focus of an article compared to standardised indexing terms (Sampagnaro, 2023). Author keyword co-occurrence analysis was performed using the full counting method, with a minimum occurrence threshold of 12. Visualisation thresholds were applied to improve the readability of the network structure. The findings are presented in accordance with the study's research questions.

V. FINDINGS

The findings of the bibliometric analysis are presented in this section. The results are organised according to the research questions to ensure analytical clarity.

Global Research Landscape

The dataset comprises 1,007 publications indexed in Scopus between 2010 and 2026. Table II summarises the main bibliometric indicators of the dataset, including citation metrics, authorship patterns, and publication characteristics.

Key indicators show a total of 5,022 contributing authors and 24,466 citations, with an average of 24.30 citations per paper. The dataset reports an h-index of 79 and a g-index of 118.

TABLE II. MAIN INFORMATION OF THE DATASET

Main Information	Data
Publication Years	2010–2026
Total Publications	1007
Citable Year	17
Number of Contributing Authors	5022
Number of Cited Papers	806
Total Citations	24,466
Citation per Paper	24.30
Citation per Cited Paper	30.35
Citation per Year	1529.13
Citation per Author	4.87
Author per Paper	4.99
Citation sums within h-Core	19,355
h-index	79
g-index	118
M-index	4.647

Publication Trends and Growth Patterns

Figure 2 illustrates the annual scientific production of AI–ASD research from 2010 to 2026. The results show a gradual increase in publications from 2010, followed by a sharp rise after 2015.

Most Productive and Influential Authors

Table III presents the most prolific authors in AI–ASD research based on total publications and citation indicators. The results indicate that Wall, D. A. is the most prolific author, with 21 publications and 1,844 total citations. Other leading contributors include Washington, P. (TP = 11; TC = 456) and Thabtah, F. (TP = 8; TC = 753), who demonstrate high publication output and citation impact.

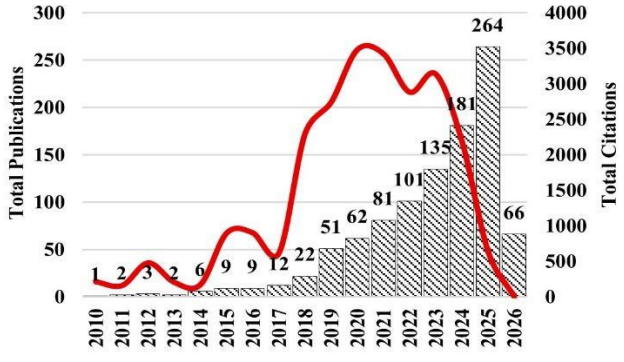


Figure 2. Annual scientific production of AI–ASD research (2010–2026)

TABLE III: MOST PRODUCTIVE AND INFLUENTIAL AUTHORS WITH MINIMUM OF EIGHT PUBLICATIONS

Author's Name	Current Affiliation	Country	TP	NCP	TC
Wall, D. A.	Stanford University	United States	21	20	**1844**
Washington, P.	University of California at San Francisco	United States	11	10	**456**
Aldhyani, T. H. H.	King Faisal University	Saudi Arabia	8	7	**163**
Hamid, R. A.	University of Information Technology and Communications	Iraq	8	7	**219**
Albahri, A. S.	Imam Ja'afar Al-Sadiq University	Iraq	8	8	**262**
Thabtah, F.	**Abu Dhabi School of Management**	**United Arab Emirates**	**8**	**8**	**753**

Note: TP=total number of publications; NCP=number of cited publications; TC=total citations

Most Productive and Influential Institutions

Table IV summarises the most productive institutions contributing to AI–ASD research. The results show that Stanford University (United States) leads with 26 publications and 1,579 citations, followed by Vellore Institute of Technology (India) with 20 publications and 423 citations, and Shenzhen University (China) with 13 publications and 204 citations.

Most Productive and Influential Countries

Table V and Figure 3 present the distribution of publications across countries. The findings show that India (235 publications) is the most productive country, followed by the United States (196 publications) and China (171 publications). In terms of citation impact, the United States records the highest number of total citations (8,902). The distribution of publications and citations indicates that research activity is concentrated in technologically advanced and research-intensive countries.

TABLE IV. MOST INFLUENTIAL INSTITUTIONS WITH A MINIMUM OF NINE PUBLICATIONS

Institution Name	Country	TP	NCA	NCP	TC
Stanford University	United States	26	123	24	**1579**
Vellore Institute of Technology	India	20	36	15	**423**
King Faisal University	Saudi Arabia	13	28	9	**176**
Shenzhen University	China	13	57	12	**204**
Prince Sattam bin Abdulaziz University	Saudi Arabia	12	14	6	**96**
King Saud University	Saudi Arabia	11	19	8	**119**
SRM Institute of Science and Technology	India	10	16	9	**133**
Al-Baha University	Saudi Arabia	9	11	7	**141**
University College London	United Kingdom	9	17	8	**187**
Chapman University	**United States**	**9**	**31**	**8**	**396**

Note: TP = total number of publications; NCA = number of contributing authors; NCP = number of cited publications; TC = total citations

TABLE V. MOST PRODUCTIVE AND INFLUENTIAL COUNTRIES WITH A MINIMUM OF 26 PUBLICATIONS

Country	TP	NCA	NCP	TC
India	235	686	180	**2888**
United States	196	869	170	**8902**
China	171	951	137	**3250**
United Kingdom	77	213	70	**3017**
Saudi Arabia	72	195	55	**1322**
Italy	52	242	44	**1435**
Malaysia	42	106	32	**979**
Turkey	27	84	19	**870**
Bangladesh	26	76	22	**1058**
Canada	**26**	**79**	**21**	**911**

Note: TP = total number of publications; NCA = number of contributing authors; NCP = number of cited publications; TC = total citations.

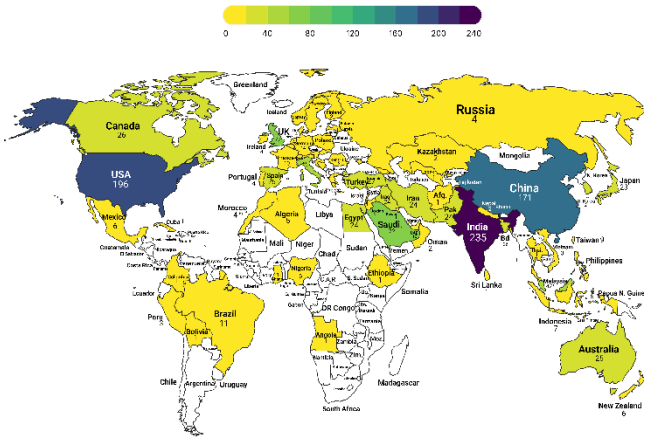


Figure 3. Worldwide scientific production indexed by Scopus on AI–ASD

Most Productive and Influential Source Titles

Table VI presents the most influential journals based on publication output and citation counts. The results show that Scientific Reports is the most productive source with (TP=36; TC=1,014), followed by Frontiers in Psychiatry (TP=21; TC=426), and IEEE Access (TP=20; TC=765). These journals represent a substantial proportion of publications in the dataset.

TABLE VI. MOST PRODUCTIVE AND INFLUENTIAL SOURCE TITLES WITH A MINIMUM OF 13 PUBLICATIONS

Source Title	TP	NCA	TC
Scientific Reports	36	238	1014
Frontiers in Psychiatry	21	137	426
IEEE Access	20	108	765
Journal of Autism and Developmental Disorders	19	113	654
PLoS ONE	17	82	567
Diagnostics	14	73	297
Biomedical Signal Processing and Control	14	56	363
Autism Research	13	92	524
Applied Sciences (Switzerland)	13	56	291

Note: TP = total number of publications; NCA = Number of contributing authors; TC = total citations

Most Cited Documents

The citation analysis identifies the most influential publications within the AI–ASD research landscape. Table VII presents the top 10 most cited documents based on total citations (TC) and citations per year (C/Y). The most cited document is by Heinsfeld et al. (2018), with 900 citations, followed by Rudovic et al. (2018) with 252 citations and Sherkatghanad et al. (2020) with 250 citations. These documents represent key contributions to the field. The distribution of citations indicates the presence of a core set of highly influential studies within the literature. These highly cited documents are predominantly focused on machine learning-based diagnostic approaches in ASD.

TABLE VII. TOP 10 MOST CITED DOCUMENTS

Ranking	Author(s)	Title	Source Title	TC	C/Y
1	Heinsfeld et al. (2018)	Identification of autism spectrum disorder using deep learning and the ABIDE dataset	NeuroImage: Clinical	900	100
2	Rudovic et al. (2018)	Personalized machine learning for robot perception of affect and engagement in autism therapy	Science Robotics	252	28
3	Sherkatghanad et al. (2020)	Automated Detection of Autism Spectrum Disorder Using a Convolutional Neural Network	Frontiers in Neuroscience	250	35.71
4	Liu et al. (2016)	Identifying children with autism spectrum disorder based on their face processing abnormality: A machine learning framework	Autism Research	249	22.64
5	Wall et al. (2012)	Use of machine learning to shorten observation-based screening and diagnosis of autism	Translational Psychiatry	249	16.60
6	Duda et al. (2016)	Use of machine learning for behavioral distinction of autism and ADHD	Translational Psychiatry	248	22.55
7	Thabtah and Peebles (2020)	A new machine learning model based on induction of rules for autism detection	Health Informatics Journal	234	33.43
8	Kong et al. (2019)	Classification of autism spectrum disorder by combining brain connectivity and deep neural network classifier	Neurocomputing	224	28
9	Kosmicki et al. (2015)	Searching for a minimal set of behaviors for autism detection through feature selection-based machine learning	Translational Psychiatry	219	18.25
10	Ahmadlou et al. (2010)	Fractality and a wavelet-chaos-neural network methodology for EEG-based diagnosis of autistic spectrum disorder	Journal of Clinical Neurophysiology	215	12.65

Note: TC = total citations; C/Y = citation per year

Research Themes and Conceptual Structure

The keyword co-occurrence analysis provides insight into the conceptual structure of AI–ASD research. The network visualisation (Figure 4) shows that the most frequently occurring keywords are centred on “autism spectrum disorder,” “machine learning,” “deep learning,” and “artificial intelligence.” These keywords form the dominant clusters in the network, indicating that research is primarily organised around technical and diagnostic themes. In contrast, keywords related to educational contexts, such as “inclusive education,” “teaching strategies,” and “socioemotional learning,” appear less frequently and form smaller, less interconnected clusters.

The overlay visualisation (Figure 5) shows that earlier publications are associated with traditional machine learning approaches, whereas more recent publications are increasingly linked to deep learning and artificial intelligence techniques. This pattern reflects a shift towards more advanced computational approaches over time.

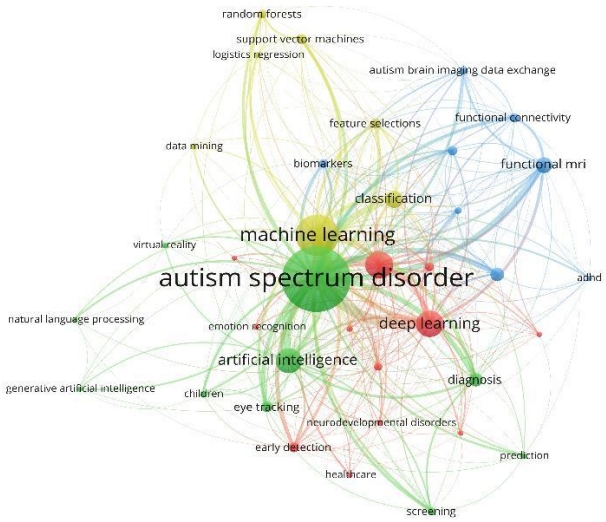


Figure 4. Network visualization of the co-occurrence analysis of the author keywords

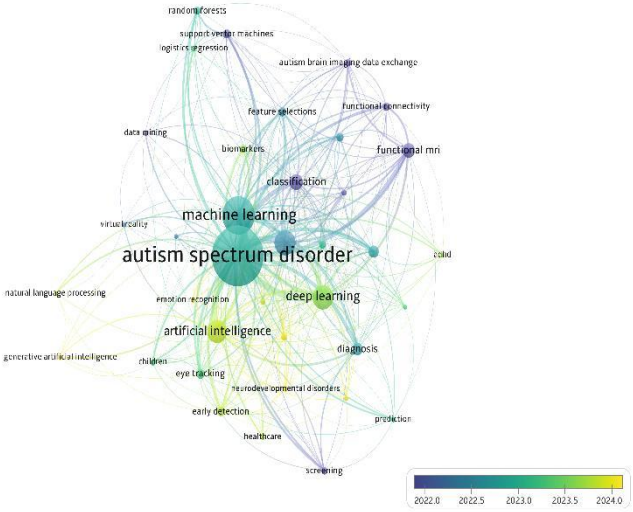


Figure 5. Overlay visualization of the co-occurrence analysis of the author keywords

VI. DISCUSSION

The findings of this study demonstrate that AI–ASD research has experienced substantial growth over the past decade, particularly following 2015, reflecting the broader expansion of artificial intelligence across interdisciplinary domains. However, this growth is characterised by a clear imbalance in research focus.

The dominance of keywords related to machine learning, classification, and diagnostic prediction indicates that the field remains strongly oriented towards technical and clinical objectives. Research efforts are primarily driven by the pursuit of computational efficiency and diagnostic accuracy, rather than broader developmental or educational outcomes. Such a pattern reinforces the notion that AI–ASD research is largely shaped by technological capabilities rather than contextual or pedagogical needs.

This pattern aligns with broader evidence indicating that AI in education remains predominantly technology-driven, with limited integration into pedagogical practice and classroom implementation (Zawacki-Richter et al., 2019). From a theoretical perspective, these findings suggest that AI–ASD research aligns with a technically oriented knowledge structure, in which knowledge production is guided primarily by computational innovation rather than educational or developmental frameworks.

While AI technologies have advanced significantly in clinical and diagnostic domains, their application in classroom settings and educational interventions remains limited. The minimal presence of keywords related to learning environments, teaching strategies, and socioemotional skills further reinforces this observation.

This trend is supported by recent systematic reviews indicating that AI–ASD research continues to prioritise diagnostic accuracy and technical optimisation, with comparatively limited attention given to real-world implementation and educational integration (Cipriano et al., 2023). AI-driven assistive technologies and behavioural assessment tools demonstrate strong performance under controlled conditions. However, their translation into naturalistic classroom environments remains limited, with effectiveness constrained by infrastructural, pedagogical, and contextual challenges, as well as insufficient longitudinal validation(Fitas, 2025; Kooli & Chakraoui, 2025; Shahini et al., 2025).

Similarly, large-scale thematic analyses of ASD research further confirm that educational applications, teacher practices, and inclusive learning strategies remain underrepresented compared to technological and clinical themes (Laçin & Özkaya, 2026). The current research landscape is structurally imbalanced, with innovation driven more by computational advances than by pedagogical priorities.

From an educational perspective, this imbalance represents a critical limitation. Socioemotional competencies are central to the development and inclusion of children with ASD, particularly in early childhood contexts, where they underpin social functioning, emotional regulation, and developmental trajectories (Anunciacao et al., 2026; Gev et al., 2021). These skills influence not only academic engagement but also broader outcomes such as social participation, mental health, and employment. The limited focus on socioemotional development within AI–ASD research indicates that current technological advancements are not fully aligned with the practical needs of learners and educators.

Importantly, the findings of this study extend beyond descriptive mapping. They reveal an underlying structural characteristic of the field. Specifically, AI–ASD research can be conceptualised as a technology-driven knowledge structure, in which knowledge production is systematically shaped by computational priorities rather than pedagogical or developmental needs. This structural orientation not only explains the persistence of technical dominance, but also accounts for the limited translation of AI innovations into meaningful educational practice. This pattern is consistent with broader trends in artificial intelligence in education, where technological innovation frequently outpaces pedagogical integration.

The implications of this finding are significant. To maximise the impact of AI in ASD, future research must move beyond diagnostic applications and prioritise the development of intervention-oriented and education-focused solutions. This includes the design of AI-based tools that

support socioemotional learning, teacher facilitation, and inclusive classroom practices. Such efforts require interdisciplinary collaboration across artificial intelligence, special education, and developmental psychology. Bridging this gap requires stronger integration across these domains.

Overall, although AI–ASD research demonstrates significant technological advancement, its translation into educational practice remains limited. This gap highlights the need to reposition the field towards developmentally meaningful and education-oriented innovation. Future research should prioritise the development and evaluation of AI-based interventions that support socioemotional development, inclusive pedagogy, and real-world classroom implementation, particularly within authentic early childhood and special education settings.

VII. CONCLUSION (OR LIMITATION OR SUGGESTION FOR FURTHER STUDIES)

This study examined global research trends in AI–ASD using a bibliometric approach, focusing on identifying dominant themes and underexplored areas within the field. The findings indicate a rapid increase in research output, with a strong dominance of machine learning and diagnostic-oriented studies. Despite these advancements, educational and socioemotional applications remain underrepresented.

Overall, AI–ASD research demonstrates substantial technological progress but remains insufficiently aligned with real-world educational needs. This imbalance limits the practical and educational impact of AI, particularly in supporting socioemotional development and inclusive learning outcomes for children with ASD. Addressing this gap requires stronger interdisciplinary integration across artificial intelligence, educational sciences, and developmental psychology.

This study is subject to several limitations. The analysis is restricted to the Scopus database and may not capture all relevant publications. In addition, reliance on author keywords may not fully reflect conceptual variations within the field. As a bibliometric study, the analysis focuses on publication patterns and does not evaluate the effectiveness of specific interventions.

Future research should prioritise the development and evaluation of AI-based educational tools that support socioemotional learning among children with ASD. Longitudinal and intervention-based studies are needed to assess the effectiveness of AI applications in real-world educational settings. This study contributes by providing a structured bibliometric perspective that informs future interdisciplinary research directions in AI–ASD.

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