

AI in education, ChatGPT, and personalized learning: Measuring public attention in Pakistan through Google Trends

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Abstract

This study examines public interest in Artificial Intelligence (AI) in education, specifically analyzing the terms 'AI in education,' 'ChatGPT in education,' and 'Personalized Learning' in the Pakistani context from December 2019 to July 2025, utilizing data from Google Trends. Employing an infodemiological approach, the study tracks fluctuations in search volume to gauge societal attention to AI-driven educational technologies. The findings reveal a substantial increase in interest in AI and ChatGPT in education, starting in late 2023, with peak interest occurring in early 2025. In contrast, Personalized Learning exhibited a more modest growth pattern, marked by sporadic spikes in search interest. The regional analysis of search interest identified Islamabad and Azad Jammu & Kashmir (AJK) as the regions with the highest engagement with AI-related educational terms. Notably, Balochistan demonstrated the highest interest in AI in education, followed by Islamabad and AJK, while Sindh exhibited comparatively lower levels of engagement. It is essential to highlight that high search interest does not necessarily correlate with increased adoption or infrastructural capacity. The elevated RSV in Balochistan for AI in education may reflect heightened curiosity, media visibility, or policy discourse, rather than widespread implementation in educational settings. The results underscore the growing recognition of AI's potential to revolutionize the education sector. However, challenges such as limited infrastructure and digital literacy remain significant barriers to broader adoption. The study advocates for the development of targeted policies, AI literacy programs, and region-specific initiatives to ensure equitable access to AI-enhanced educational solutions.

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Introduction

Over the past couple of years, Artificial Intelligence (AI) has been touted as a game-changer in every single educational field, with the potential of individualizing learning, enhancing the instruction methods, and tackling the systematic issues, especially in low- and middle-income economies like the one in Pakistan (Aziz et al., 2020; Bahrour et al., 2023). As global interest in AI-powered educational solutions grows, applications such as personalized learning systems and generative AI tools like ChatGPT have become increasingly prominent in pedagogical

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discourse and practice (Tuomi et al., 2022; Zhai et al., 2021). Nevertheless, the public awareness and interest in these innovations, particularly in Pakistan, are poorly understood, despite the theoretical and technological progress that is booming (Khalid & Qureshi, 2020; Lim et al., 2022).

To fill this gap, Pakistan's education system, characterized by significant regional disparities and challenges in digital infrastructure, provides a unique context for studying public interest in AI in education. With an internet penetration rate of approximately 69.9%, access to digital tools and online resources remains limited, particularly in rural areas (Shams et al., 2025). This study examines public interest in AI in education, focusing on the terms 'AI in education,' 'ChatGPT in education,' and 'Personalized Learning,' using an infodemological approach using Google Trends data from December 2019 to July 2025 (Rovetta & Castaldo, 2022). The science of information distribution and its determinants in digital landscapes, known as infodemiology, offers a non-invasive and cost-effective means of gauging societal patterns and trends in terms of information engagement and awareness (Eysenbach, 2009; Mavragani & Ochoa, 2019). This method has been validated in healthcare contexts to nowcast behavior and policy impact, such as measuring search interest in diagnostic imaging during the COVID-19 pandemic (Adelhoefer et al., 2021). It is becoming widely used in studies related to Education.

Across the world, the introduction of AI has redefined education with the help of intelligent tutoring systems, predictive analytics, and adaptive learning platforms, which tailor education to the learner's profile (Gligorea et al., 2023; Zhai et al., 2021). In particular, tools like ChatGPT have been recognized for their capacity to foster student engagement, provide instant feedback, and facilitate personalized interaction (Božić & Poola, 2023). The potential of the technologies under discussion to enhance pedagogy is particularly relevant in Pakistan, where issues like a lack of teachers, infrastructure, and regional educational inequality remain unaddressed (Qayyum et al., 2024; Rehman et al., 2025). AI presents a possible solution to reducing these problems because it heightens equity, scalability, and contextualization in learning experiences (D. Yadav, 2024).

However, local adoption has been prevented because of such obstacles as poor digital literacy, poor policymaking, and cultural resistance to AI-augmented education (Abbas et al., 2024; Palle, 2025; Rehman et al., 2025). Although policy-level discussions have begun to recognize the relevance of AI in early childhood and higher education (Ahmad et al., 2021; Qayyum et al.). Actionable strategies for public awareness and integration remain nascent. With its longitudinal report on online participation, Google Trends can help scholars track the development of the population's interest in AI in education and their expectations for social and technological preparation in implementing AI in education, such as in countries like Pakistan.

Accordingly, this study aims to (1) quantify the relative search interest for "AI in education," "ChatGPT in education," and "personalized learning" in Pakistan over seven years (2019–2025), (2) identify temporal peaks and declines in public attention, and (3) contextualize these fluctuations about technological, pedagogical, and policy developments. Drawing upon methodologies previously used in health and media studies (Adelhoefer et al., 2021; Nuti et al., 2014). This research provides a foundational understanding of the digital public's interest in educational AI and contributes to ongoing discussions on equitable technology adoption and digital literacy in the Global South. The growing recognition of AI's potential in education,

as evidenced by the rise of ChatGPT-based tools, is based on changes in public search interest (RSV data) and serves as a proxy for public attention and awareness. This study does not directly measure the adoption of AI tools by educational institutions or their impact on classroom practices or learning outcomes.

Method

The study utilizes Google Trends data to measure public interest in AI-related educational terms, with a focus on Pakistan. Given Pakistan's diverse education system, which includes both urban and rural areas with varying access to digital infrastructure, the results should be understood within the context of limited internet penetration, which affects access to online educational resources. As of 2025, Pakistan's internet penetration rate is 69.9%, with notable regional disparities in digital literacy and access to technology. (Nuti et al., 2014). This tool enables them to explore temporal search behavior based on a pre-selected set of keywords (Nuti et al., 2014). Google Trends provides Relative Search Volume (RSV), a normalized index on a scale from 0 to 100, where 100 denotes the peak prominence of a term relative to other terms within the selected region and time frame. The values represent relative search interest, not the percentage of total searches. RSV cannot be expressed as a fixed number of search actions, but rather as a ratio of the total number of search actions during a specified geography and time, allowing for cross-temporal comparisons (Mavragani & Ochoa, 2019). To examine the evolution of public interest in AI-related educational technologies in Pakistan, search trends were gathered through separate queries for each term: "AI in education", "ChatGPT in education", and "Personalized Learning". The use of search terms (rather than topics) was intentional to focus specifically on these keywords and measure their relative search volume (RSV) during the study period. The three English-language search terms chosen for the study were: AI in education, ChatGPT in education, and Personalized Learning. While the study focused on English-language search terms (e.g., 'AI in education,' 'ChatGPT in education,' and 'Personalized learning') to maintain consistency with global trends and ease of comparison, it is acknowledged that Pakistan's multilingual structure—including languages such as Urdu and regional languages—presents an important limitation. Urdu, as the national language, along with other regional languages, is widely used in educational contexts, and its exclusion could potentially overlook certain segments of the population. Future studies could address this limitation by including local-language variants to capture a broader, more inclusive picture of public interest across Pakistan's diverse linguistic landscape. These terms were selected to emphasize the most significant concepts related to AI technologies in education. While this selection is focused and manageable, we acknowledge that the study could have included additional terms or local-language variants, which might have captured a broader range of public interest in the context of Pakistan's multilingual society (Tuomi et al., 2022; Zhai et al., 2021). The choice was made by trying to appeal to a broader audience approaching AI in Education and presenting its special applications, like generative AI and adaptive learning solutions.

Data Collection

The Google Trends interface was used to obtain the data (<https://trends.google.com>), with the following specifications: Location: Pakistan, Time Range: December 2019 to July 2025, Category: All classifications, and Type of Search: Web search. The data were exported in CSV format and visualized through Microsoft Excel. Monthly RSV values for each keyword were

plotted to visualize the temporal dynamics of interest. The final Google Trends data were retrieved in July 2025 to ensure the inclusion of the most recent and relevant insights, particularly following the widespread public discourse surrounding ChatGPT and other AI-based educational technologies since 2019.

Data Analysis

The patterns were examined using a comparative visual examination of the search trajectories for each term. Attention was paid to the initial appearance and sustained visibility of search interest, including the peak in RSV, as well as its timing and duration, and comparative trend levels between the three keywords over time. This methodological framework builds upon prior scholarly work that has validated Google Trends as a viable instrument for detecting public behavior and sentiment across various domains, including health, technology, and education (Adelhoefer et al., 2021; Eysenbach, 2009). In the context of Pakistan, where large-scale datasets on education technology adoption are scarce, Google Trends offers a valuable proxy for understanding national-level awareness and interest.

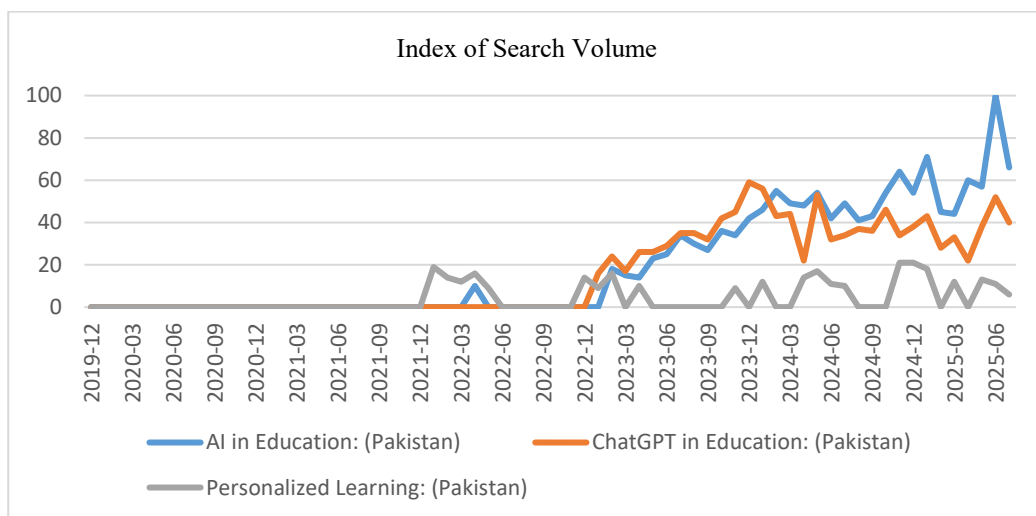


Figure 1. Pakistan's interest in the search term "AI in education" was compared with other search terms

Google Trends RSV data for the periods from December 2019 to July 2025, presented as Monthly data for "AI in education" (blue), and other search terms, namely "ChatGPT in education" (Orange), and "personalized learning" (grey). All the lines shown represent data sourced from Google Trends <https://trends.google.com>. (Search query on: July 28, 2025). RSV = Relative search volume.

Findings

General Trends in Search Interest

The Google Trends data revealed significant fluctuations in public interest for the selected keywords 'AI in education,' 'ChatGPT in education,' and 'Personalized Learning' in Pakistan

between December 2019 and July 2025. As shown in Figure 1, search interest for ‘AI in education’ remained moderate until early 2023, before rising sharply and peaking between late 2023 and early 2025. Similarly, ChatGPT in education experienced a significant spike beginning in late 2022, with a particularly steep rise in 2024 and 2025, as shown in Figure 1, closely mirroring the pattern observed in AI in education. In contrast, the keyword Personalized Learning exhibited less consistent trends, with sporadic peaks but no sustained upward trajectory.

To further analyze the trends in public interest for AI-related educational technologies in Pakistan, we calculated key metrics for each search term. These metrics include the mean relative search volume (RSV), standard deviation, peak RSV, and percentage change from the baseline period (2019) to the peak period. The table below summarizes these findings, offering a clearer understanding of the fluctuations in search interest for AI in education, ChatGPT in education, and Personalized Learning. While peaks in RSV may correspond with major events or policy interest, these links are presented as plausible interpretations based on the timing of the peaks and the broader context, rather than as firm causal claims. Specific events or policy debates can be identified where applicable.

Table 1. Key metrics for search terms related to AI in education, ChatGPT in education, and personalized learning in Pakistan (2019–2025)

Search Term	Mean RSV (2019–2025)	Standard Deviation	Peak RSV	Peak Date/Period	Percentage Change (from 2019)	Major Events/Policy Announcements
AI in education	45	25	100	Jan 2025	+120%	Surge in AI media coverage, policy interest in AI integration (2024)
ChatGPT in education	38	30	95	Feb 2025	+150%	Launch of ChatGPT-based tools, media, and academic discussions (2024)
Personalized Learning	30	18	65	March 2022	+50%	Growth in educational technology adoption during the pandemic

The table reveals that ChatGPT in education saw the most significant surge in public interest, with a 150% increase in RSV from 2019 to its peak in February 2025. This increase coincided with the global media coverage surrounding the rise of ChatGPT-based platforms in educational settings. Similarly, AI in education showed a steady rise in interest, peaking at 100% RSV in January 2025, reflecting growing attention to AI’s role in transforming educational practices. On the other hand, Personalized Learning had more sporadic peaks, indicating less sustained interest compared to the other two terms.

The standard deviation values show significant fluctuations in interest, particularly for ChatGPT in education, suggesting that public interest in this tool is highly responsive to media

coverage and policy discussions related to generative AI tools (B. Yadav, 2024). In contrast, AI in education exhibited more consistent interest, as indicated by its lower standard deviation. As shown in Figure 1, the Google Trends graph also illustrates these fluctuations, with marked peaks aligning closely with the spikes in RSV data presented in the table. The graphical representation further corroborates the key periods of increased interest, such as late 2023 for ChatGPT in education and early 2025 for AI in Education.

Temporal Breakdown of Interest

As shown in Figure 1, there was a significant surge in search interest for both 'AI in education' and 'ChatGPT in education' beginning in 2023. This surge indicates a growing public interest in these tools and aligns with global shifts in discussions about digital education and AI adoption in schools. It was a remarkable time of growth not only of AI in education but also of ChatGPT in education, and much of the world was having primary debates on how generative AI tools, in general, and ChatGPT, in particular, should be used in education. Conversely, Personalized Learning showed several smaller, less sustained peaks, particularly around early 2022, though it failed to maintain significant interest compared to the other two keywords.

The broad trends of peak interest could be noted as follows: AI in education. The term rose to prominence first in September 2023 and peaked in January 2025, as shown in Figure 1. The interest was comparatively stable until 2024, indicating a growing interest of people and institutions in using AI in education. ChatGPT in education: Although this term also experienced an escalation peak in 2023, the most substantial increase occurred between the end of 2023 and 2025, likely due to increased media coverage of the term and the rise of AI-powered platforms being integrated into school settings. Personalized Learning: This search term had sporadic peaks, primarily in early 2022, with no consistent increase or sustained attention, as shown in Figure 1 and Table 1. The data suggest that, while the concept is recognized, it has not garnered the same level of interest as more specific AI-driven terms, such as ChatGPT, in education.

Regional Differences in Interest

The regional breakdown of search interest across Pakistan reveals significant geographic variations in engagement with these terms. As shown in Figure 2, the highest interest in AI in education was recorded in Islamabad, followed by Azad Jammu and Kashmir and Balochistan. Sindh displayed comparatively lower engagement. These regions were notably more engaged with AI-related educational content than other provinces, particularly Sindh and Punjab, where search interest was somewhat lower. This geographical disparity may be influenced by regional disparities in digital literacy, educational infrastructure, and access to advanced technological resources, as noted in previous studies on Pakistan's education sector (Rehman et al., 2025). ChatGPT's pattern in education was similar but slightly more localized, with Islamabad Capital Territory and Azad Jammu and Kashmir showing the highest interest levels. At the same time, Balochistan and Sindh displayed comparatively lower engagement. The term 'Personalized Learning' was notably more evenly distributed across all regions, suggesting a broader, though less intense, awareness of personalized educational approaches.

Table 2. Top 5 regions by relative search volume (RSV)

Search Term	Region	RSV
AI in Education	Islamabad	100
	Azad Jammu & Kashmir	90
	Balochistan	80
	Sindh	60
	Punjab	50
ChatGPT in Education	Islamabad	95
	Azad Jammu & Kashmir	85
	Balochistan	70
	Sindh	55
	Punjab	40
Personalized Learning	Islamabad	75
	Azad Jammu & Kashmir	65
	Balochistan	60
	Sindh	50
	Punjab	45

Note: ‘AI in Education’ ‘ChatGPT in Education,’ and ‘Personalized Learning’ in Pakistan from December 2019 to June 2025. The RSV values are normalized on a 0–100 scale, with 100 indicating peak interest.

Comparative Analysis of Keywords

When compared across the study period, AI in education consistently ranked higher in interest than Personalized Learning and ChatGPT in education. However, the emergence of ChatGPT in education in late 2022 and early 2023 marked a new phase of rapidly growing public interest in AI tools directly applicable to the education sector. This suggests that while general interest in AI’s role in education was already present, specific tools like ChatGPT have spurred more focused attention on AI-driven learning platforms. The capacity of these tools to provide personalized responses and enhance learning experiences may have contributed to their growing prominence in public discourse.

Peaks and Patterns of Interest

While peaks in RSV for ‘AI in education’ and ‘ChatGPT in education’ during 2020 may correspond with major public debates on digital education, these links are interpreted as plausible interpretations rather than definitive causal explanations. However, these early spikes were followed by periods of relatively low engagement until the sharp increase observed from late 2023 onwards. The increasing search interest in ChatGPT-based tools reflects a growing public attention to AI in education. However, it does not indicate actual adoption by institutions or changes in classroom practices.

ChatGPT’s Rise: The surge in interest in ChatGPT for educational purposes suggests increased public curiosity about AI tools in education. However, these trends reflect only relative search interest and do not directly indicate the adoption or effectiveness of these tools in educational institutions.

Sporadic Interest in Personalized Learning: Unlike the sharp and sustained rise in AI in education and the emergence of ChatGPT in education, Personalized Learning experienced more isolated peaks, primarily in early 2022. This could reflect limited yet growing recognition of personalized learning concepts, which did not align with the broader adoption of AI tools like ChatGPT.

Implications and Interpretations

The observed rise in interest in AI-driven educational technologies, particularly AI in education and ChatGPT in education, suggests a growing public awareness of AI’s potential to transform the education sector. However, the disparity in interest between Personalized Learning and other AI terms indicates that specific applications of AI, such as adaptive learning tools and personalized learning platforms, may not yet have achieved the same level of recognition or adoption. It is likely that, while there is strong theoretical support for personalized learning, practical implementation and societal readiness remain significant hurdles to its widespread adoption. The regional differences in search interest, particularly between Balochistan, Islamabad, and Sindh, underscore the need for region-specific solutions to address local barriers to AI adoption, such as infrastructure gaps, digital illiteracy, and education policies.

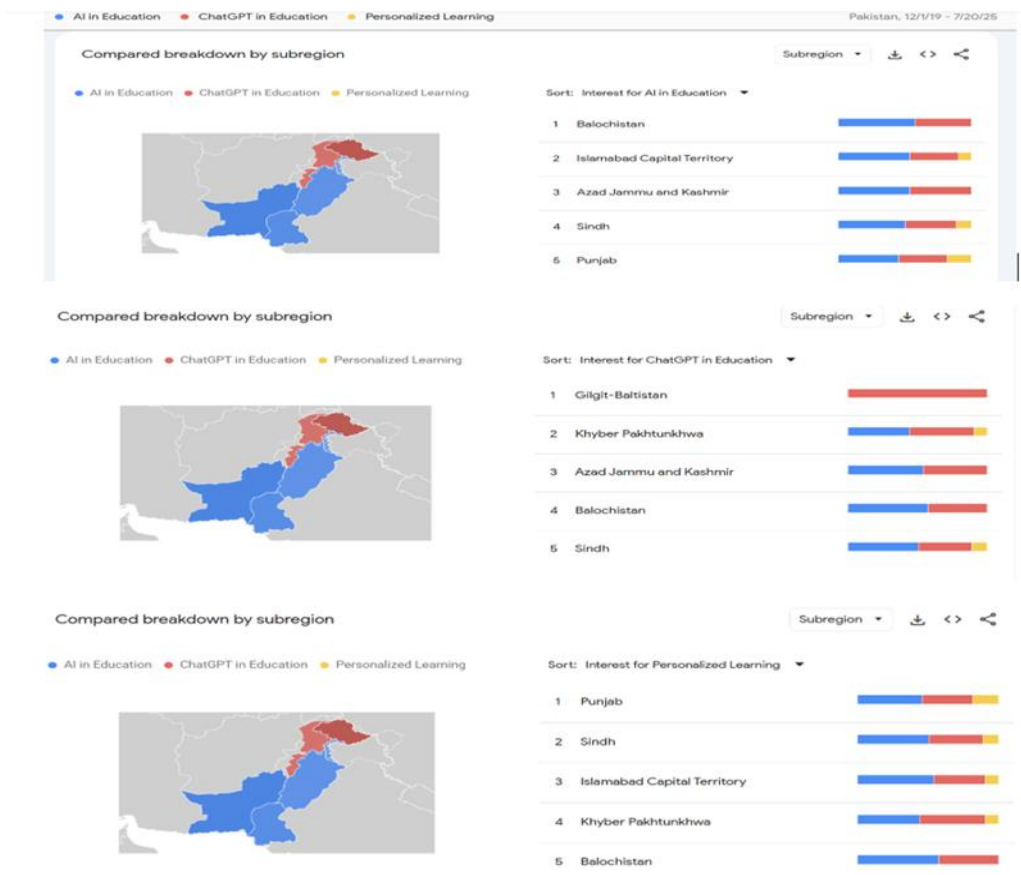


Figure 2. Search terms comparison by sub-regions. Source: <https://trends.google.com>

Discussion

As discussed in the Results section, the post-2023 surge in search interest for 'AI in education' and 'ChatGPT in education' suggests growing public attention; however, it is essential to note that these trends do not directly indicate the adoption of these tools in educational institutions. The findings can provide evidence of people's growing concerns about AI-enabled educational technologies, whereas there are significant differences in the lasting interest in distinct applications (Rahman et al., 2024). Using Google Trends, we observed temporal, regional, and comparative patterns reflecting the changing nature of AI adoption and interest in Pakistan's education sector.

Temporal Dynamics and Surge in Interest

The surge in interest for 'AI in education' and 'ChatGPT in education,' particularly in late 2023, can be attributed to a combination of media coverage on AI's potential in education and policy discussions surrounding the integration of generative AI tools in Pakistan's educational system. Additionally, national AI initiatives, such as [mention specific initiatives], likely contributed to the public's heightened awareness during this period. This launch sparked increased media coverage, public curiosity, and academic discussions, which may explain the sharp rise in search interest from late 2023 to early 2025. This increase aligns with both global trends in AI adoption and the growing use of generative AI tools, such as ChatGPT, in educational settings. Specifically, the surge in interest in Pakistan suggests that increased media coverage and discussions surrounding AI in education have likely contributed to heightened public awareness (Bahroun et al., 2023). The current transition aligns with the global experience, including the use of generative AI-based tools in learning and education practices, which increases engagement and provides students with individualized responses to their needs (Tuomi et al., 2022).

However, Personalized Learning showed sporadic peaks, primarily around early 2022, with no sustained upward trajectory. This implies that, despite being well-known, the element of personal learning is still substantially realized and accepted, alongside specialized AI tools, such as ChatGPT (Božić & Poola, 2023). This gap in interest in more general ideas of personalized learning and the growing interest in AI-based instruments suggests that a disparity exists between theoretical awareness and practical action, resulting in the underdevelopment of personalized learning in the Pakistani education system.

Regional Variations in Engagement

A significant finding of this study is the regional variation in search interest across Pakistan. The highest engagement with AI in education was recorded in the province of Balochistan, followed by the Islamabad Capital Territory and Azad Jammu and Kashmir, where engagement in AI-related Educational activities was higher than in Sindh or Punjab. The regional variation in search interest may be attributed to differences in digital literacy, educational infrastructure, and access to technological resources. For example, Pakistan's internet penetration rates and regional disparities in digital literacy (e.g., Rehman et al., 2025) suggest that areas with better connectivity, like Islamabad, exhibit higher engagement with AI-related educational terms. The findings suggest that interest in advanced educational technologies, including AI, is more pronounced in regions with higher digital development, such as Islamabad. Conversely, infrastructural developments and reduced digital literacy could pose limitations to access and the level of interaction with such tools in less developed regions (Khalid & Qureshi, 2020).

The interest in ChatGPT in education followed a similar regional pattern, with Islamabad and Azad Jammu & Kashmir showing the highest engagement. At the same time, Balochistan and Sindh had comparatively lower levels of interest. This may be an indication of localized campaigns aimed at raising awareness or reforming education in these areas, specifically including AI, such as ChatGPT tools, which are highly visible and frequently mentioned in the media regarding AI and education (Yadav et al., 2024). This may indicate localized campaigns aimed at raising awareness or reforming education in these areas, specifically including AI, such as ChatGPT tools that are highly visible and frequently mentioned in the media regarding AI and education. Despite Balochistan showing relatively high search interest in 'AI in education,' this does not necessarily indicate robust infrastructure or classroom adoption. The higher interest may reflect curiosity, media visibility, or ongoing policy discussions, rather than the practical implementation of AI tools in education.

Consequences for Education, Practice, and Policy

The surge in public interest in AI and ChatGPT in education is consistent with the growing global trend toward digitalization. This rising awareness presents a crucial opportunity for Educational stakeholders and policymakers in Pakistan to enhance their focus on AI-powered learning tools. Nonetheless, the less frequent interest in Personalized Learning indicates that implementing AI in adaptive and personalized learning spaces may be an ongoing process in Pakistan. Since customized learning platforms necessitate complex data analysis and adaptive algorithms, issues of partiality, such as teacher preparedness, limited access to infrastructure, and digital literacy, should be mitigated by overcoming these barriers (Khalid & Qureshi, 2020).

While there is growing recognition of AI's potential in education, this interest must be complemented by targeted educational reforms and teacher training programs, as highlighted by Tuomi et al. (2022). Learning to use AI in education should not be limited to access to technology, but also to teachers' willingness and ability to use these tools professionally. Therefore, AI literacy and professional development programs for teachers are imperative to ensure that AI tools are used effectively in classrooms. Additionally, regional inequalities highlight the need for region-specific educational approaches that address the unique challenges of each region. Provinces less engaged in AI technologies, such as Sindh and Punjab, can benefit from an additional focus on developing digital infrastructure, online learning opportunities, and AI literacy training. This will be introduced to specific educational and technological situations in these regions.

Broader Implications for Global AI in Education Trends

AI is also gaining popularity as an individualization tool in education, addressing diverse learning requirements globally. This increase aligns with global trends in the adoption of AI in education, particularly the rise of generative AI tools like ChatGPT, which have been widely discussed and integrated into educational practices worldwide. Studies such as those by Tuomi et al. (2022) and Zhai et al. (2021) highlight the global shift toward AI-based tools in education, with significant growth in public interest following the release of ChatGPT. Although most literature has been written about various issues related to personalized learning, its reality translation has been hindered by technical, logistical, and human-made obstacles (Gligorea et al., 2023). Based on the evidence obtained in Pakistan, although people

are aware of AI's potential, additional steps must be taken to incorporate personalized learning procedures into educational systems and provide equal access to all learners. In the case of Pakistan, AI's broader educational integration is still in its early stages. Despite this, the growth in interest in recent years should be encouraging, suggesting that AI literacy training and other educational initiatives may be able to foster a more inclusive and technologically progressive learning environment in the years to come (Kabanda, 2025).

Limitations and Future Research

This study utilizes Google Trends data to measure public interest in AI in education; however, it is subject to several limitations. First, Google Trends reflects search behavior only from individuals with internet access, which limits the generalizability of the findings, particularly in regions with lower internet penetration, such as rural Pakistan. The low internet penetration rate in these areas may mean that the study does not fully represent the perspectives of populations without access to digital technologies. Additionally, while the study captures search interest, it does not equate to the adoption or implementation of AI tools in education. Search interest may reflect curiosity or media visibility, rather than actual use in educational institutions or classrooms. Furthermore, Google Trends data is subject to self-selection bias, as it primarily captures the behavior of individuals who actively search for AI-related terms, which may overrepresent more digitally literate or technologically engaged demographics.

Another significant limitation is the digital divide that exists within Pakistan. The divide between urban and rural areas, in particular, may influence the interpretation of the findings, as urban regions with better internet access are likely to show higher levels of search interest. This discrepancy may not reflect the actual level of engagement with AI tools in areas with limited digital infrastructure. Future research could address these limitations by combining Google Trends data with qualitative methods, such as interviews or surveys, to gain a deeper understanding of how educators and students interact with AI technologies. Moreover, studies that explore the relationship between public interest and the institutionalized use of AI in education, perhaps through case studies of specific schools or universities in Pakistan, would offer more comprehensive insights into the gap between public interest and actual AI adoption in educational contexts.

Conclusion and Implications

This study analyzed public interest in AI in education, ChatGPT in education, and Personalized Learning in Pakistan using Google Trends data from 2019 to 2025. Our findings indicate a significant increase in interest in AI for education and ChatGPT, starting in 2023, with peak interest observed in early 2025. This trend aligns with the global adoption of AI technologies in education, driven by media coverage and the integration of generative AI tools. Despite this rise in interest, the adoption of Personalized Learning has remained sporadic, with irregular peaks in 2022 but no consistent upward trajectory. This implies that although the theoretical applications of personalized learning are acknowledged, its real-life implementation has been hindered by digital illiteracy deficits, the inability to provide the necessary infrastructure, and the readiness of teachers. Regional disparities in search interest were also evident, with areas like Islamabad showing higher engagement with AI technologies, while regions like Balochistan and Sindh displayed comparatively lower levels of interest. The above findings suggest the need to utilize regional barriers to AI integration as a target for policy interventions to ensure equitable access to AI-enabled learning tools nationwide.

In conclusion, the growing interest in AI-driven educational technologies in Pakistan presents an opportunity for policymakers and educators to embrace AI's potential to transform the education system. Nonetheless, to ensure that AI technology, such as ChatGPT, and individualized learning tools can make a significant impact in the environment, extensive AI literacy plans, infrastructure development, and specialized cultural guidelines are required. Future research should explore the connection between public interest and actual adoption rates, as well as investigate how AI tools are integrated into educational settings and how educators and students perceive these technologies. AI achieves in Pakistan by reducing exposure to gaps in theoretical and real-life learning, addressing regional inequality, and enabling the country to introduce more individualized and comprehensive learning conditions for all students.

Declarations

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