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AI assistants in education and research : A sentiment-based comparative analysis of ChatGPT, Gemini, and Perplexity

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This study examines user perceptions of ChatGPT, Gemini, and Perplexity using Google Play Store reviews. Sentiment analysis was conducted using the Appbot analytics software, which enabled systematic classification of user opinions into positive, negative, and neutral categories. The study adopts a comparative and descriptive research design to understand variations in user satisfaction across different AI assistants used in education and research contexts. User satisfaction was assessed through ratings, sentiment distribution, review volume, language diversity, and key thematic patterns. The analysis is based on large-scale, naturally occurring user-generated data, offering insights grounded in real-world usage rather than experimental settings.

ChatGPT demonstrated the highest user engagement, with 81% positive reviews and the largest review volume. Gemini, although widely adopted, exhibited more polarized feedback, with 74% positive and 15% negative sentiment. Perplexity received fewer reviews but maintained 79% positive sentiment, indicating steady user satisfaction. Reviews of ChatGPT and Gemini reflected broad global language diversity, whereas Perplexity reviews were predominantly English. This variation suggests differences in global reach, adoption patterns, and localization strategies among the platforms.

Across all three platforms, common themes included perceived helpfulness, creativity, and support for learning and research activities. At the same time, users reported concerns related to response speed, subscription costs, and technical limitations. These concerns highlight practical challenges that may affect long-term user trust and sustained adoption of AI assistants in academic environments. The findings offer comparative insights into how AI assistants are perceived by learners and researchers and underscore important implications for institutional decision-making regarding the responsible and sustainable integration of AI tools in higher education. The study contributes to emerging

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literature on AI-enabled educational technologies by positioning user sentiment as a critical dimension of technology acceptance, usability evaluation, and policy formulation.

Keywords: *Artificial intelligence, ChatGPT, Gemini, Perplexity, Sentiment analysis, User satisfaction, Mobile app, Appbot.*

1. Introduction

Artificial Intelligence (AI) has rapidly become integrated into nearly every domain, offering significant support in enhancing efficiency, saving time, and improving the quality of work. Within education and research, AI is increasingly applied as a learning aid, a research facilitator, and a tool for libraries to expand their services and reach. This growing adoption reflects the broader trend of digital transformation, where emerging technologies reshape the academic ecosystem by fostering new modes of access, collaboration, and knowledge dissemination. AI assistants are now being used to complement teaching, learning, and research activities, positioning them as valuable supports within the higher education and library context. In this context, understanding how users perceive and evaluate these AI assistants becomes crucial for informed adoption, effective integration, and responsible use within academic institutions.

AI can be defined as the ability of a computer system to perform tasks that would normally require human intelligence, such as understanding natural language, recognizing images or objects, and making decisions [1]. These systems are designed to learn and adapt from new data, becoming more effective, efficient, and accurate over time [2]. As such, AI technologies continue to advance in both scope and application, creating opportunities across multiple sectors. However, the rapid deployment of AI tools has often outpaced systematic evaluation of user experiences, satisfaction, and perceived value, particularly in educational and research settings.

The development of societies in recent times has been greatly facilitated by the growing demand for access to information, with libraries serving as prime sources in fulfilling this need. However, the rapid advancements in computer technology and software applications, particularly in AI, have triggered a paradigm shift in the format and dynamics of information and knowledge. This shift has also increased the demand for libraries to adopt and integrate these technologies [3]. AI in education similarly demonstrates potential to revolutionize teaching and learning by making processes more personalized, engaging, and efficient, often drawing on machine learning and natural language processing techniques [4]. Evaluating AI assistants through user-generated feedback allows libraries and educational institutions to assess whether these technologies genuinely support learning and research needs or introduce new challenges for users.

The application of AI in libraries has become increasingly visible, ranging from expert systems for reference services to robots for book handling and immersive learning tools [5]. Unless libraries adopt emerging technologies such as AI to innovate their services, they risk obsolescence in a rapidly digital society [6]. AI tools are not intended to replace

librarians but to enhance service delivery and strengthen user engagement [1]. Libraries, as central institutions supporting education, research, and community development, must therefore adapt to this evolving technological landscape to continue fulfilling their roles effectively [3]. From this perspective, examining user sentiment towards AI assistants is significant for guiding policy decisions, service design, and training initiatives within libraries and higher education institutions.

Mobile applications, including AI assistants such as ChatGPT, Gemini, and Perplexity, have become increasingly important tools in education, research, and library services. These apps provide accessible platforms for information retrieval, learning support, and problem-solving, allowing users to interact with AI systems conveniently on smartphones and tablets. Their growing adoption reflects the integration of AI into everyday academic and professional tasks. By offering a comparative sentiment-based analysis of these widely used AI assistants, the present study contributes empirical evidence that can support educators, librarians, and institutional leaders in selecting, implementing, and sustaining AI tools that align with user expectations and academic objectives.

Research Gap and Rationale

Despite the growing presence of AI assistants in education and research, systematic studies examining end-user perceptions remain limited. Existing literature largely focuses on technical capabilities, system architecture, or institutional adoption strategies, with comparatively little attention to large-scale user feedback reflecting everyday experiences. This gap is significant because the effectiveness and sustained adoption of AI tools depend not only on their technical sophistication but also on how users perceive their usefulness, usability, and support for learning-related tasks.

There is a lack of comparative, sentiment-based studies that examine how users experience widely used AI conversational assistants such as ChatGPT, Gemini, and Perplexity in real-world educational and research contexts. Although these tools differ in design philosophy, interaction style, and information delivery, empirical evidence comparing user sentiment across these platforms remains scarce.

User reviews, ratings, and comments provide rich insights into authentic interactions that are often absent from controlled experiments or survey-based studies. Analyzing such naturally occurring user-generated data enables a more grounded understanding of user satisfaction, challenges, and expectations related to AI-assisted learning and information seeking.

By combining sentiment analysis with qualitative thematic interpretation of Google Play Store reviews, this study addresses the identified gap by offering a user-centered evaluation of AI assistants. The findings aim to inform educators, librarians, and researchers about the opportunities and limitations of these tools, thereby supporting responsible AI integration, digital literacy initiatives, and evidence-based decision-making in higher education and library services.

Literature Review

Mobile Applications and AI Assistants in Education and Research

Mobile applications (apps) are software designed for smartphones and tablets, increasingly recognized as essential tools for teaching, learning, and research in higher education [7]. Mobile applications have become the dominant mode of accessing digital services, with more than 6.3 billion smartphone users globally and over 218 billion annual app downloads [8] is one of the leading categories, reflecting the growing reliance on apps for learning and research. The mobile app market has fluctuated in recent years, shaped by post-pandemic recovery and the rise of generative AI. In 2024, AI chatbot apps such as ChatGPT recorded over 112% year-over-year growth in downloads, highlighting their growing impact on user engagement [9].

Studies show that nearly all students in higher education now have smartphones, with many using apps for academic tasks such as accessing course content, storing documents, or collaborating with peers [10]. While institutional support remains uneven, app use is often driven by personal motivation, indicating the potential for greater integration if universities promote and support mobile initiatives [7].

Mobile learning apps have also been shown to improve student engagement, motivation, and cognitive development. In their study, Camilleri and Camilleri [11] found that children using educational apps reported gains in communication, collaboration, and problem-solving skills, highlighting the role of apps in fostering both academic and social competencies. Similarly, apps incorporating simulation, storytelling, and serious games provide immersive, goal-directed learning experiences that enhance skills beyond cognitive abilities, such as self-regulation and teamwork [11]. In higher education, apps are primarily used for communication, information distribution, data storage, and collaborative research, though their use in in-class or in-field activities remains limited [7].

In all, the literature emphasizes that mobile apps are no longer peripheral technologies but core components of digital education, extending access to knowledge, supporting collaboration, and enhancing both teaching and research practices [12].

Comparative Studies of AI Assistants

Whitfield and Yang [13] evaluated ChatGPT, Gemini, and Copilot in academic library reference services using 28 standardized reference queries. Responses were assessed for accuracy, relevance, friendliness, and instructiveness. Gemini achieved the highest overall performance, particularly in relevance and instructiveness, while ChatGPT scored highest in accuracy. Copilot provided shorter, less informative responses. The study concluded that although GenAI chatbots can supplement reference services, librarian oversight remains essential for complex or locally specific queries.

Shukla et al. [10] conducted a comparative study of ChatGPT, Gemini, and Perplexity AI focusing on content generation, information retrieval, context understanding, transparency, and pricing. ChatGPT excelled in creative content generation, Gemini in providing current information and multimodal understanding, and Perplexity AI in

retrieving precise, citation-supported information. These results highlight the importance of selecting AI tools according to specific user needs.

Salih et al. [14] assessed ChatGPT, Gemini, and Perplexity using fifty multiple-choice questions on research publication principles. ChatGPT scored slightly higher (76%) than Gemini and Perplexity (72%), though all systems exhibited variations across categories. ChatGPT performed best on literature review questions, Gemini showed moderate overall performance, and Perplexity excelled in research writing. The study noted strong agreement between ChatGPT and researchers (around 80-85%), demonstrating its potential as a research aid. However, all AI systems had limitations, including biases, errors in certain research areas, and the need for human oversight to ensure reliable research outputs.

Negi and Sharma [15] analyzed user reviews of the Rashtriya e-Pustakalaya mobile application to evaluate its role as a digital library platform. Using Appbot for sentiment analysis, the authors categorized Google Play Store reviews into positive, negative, neutral, and mixed sentiments, followed by thematic analysis. Findings showed that users appreciated accessibility, language diversity, and ease of use, while concerns included technical bugs, slow performance, and lack of offline access. The study concludes that although the app promotes digital literacy and mobile learning, challenges remain in terms of technical reliability, personalization, and the need for continuous updates.

Above studies provide a foundation for examining user satisfaction and experiences with AI assistants in library, education, and research contexts. They also reveal gaps, particularly regarding mobile app interfaces, user engagement, and sentiment-driven feedback, which the present study aims to address.

Study Objectives

This study aims to achieve the following research objectives:

- To evaluate user perceptions of ChatGPT, Gemini, and Perplexity through a rate-wise analysis of app reviews.
- To conduct a sentiment analysis of user feedback in order to classify reviews as positive, negative, neutral, or mixed.
- To measure and compare the sentiment scores of the three AI assistant apps.
- To analyze the review volume trends to understand patterns of user engagement over time.
- To examine the language distribution of reviews, identifying regional and linguistic diversity in user feedback.
- To generate word clouds of frequently occurring terms in reviews, highlighting recurring themes and user concerns.

Research Methodology

The research design adopted in this study is Mixed Method Research (MMR), combining quantitative and qualitative approaches to gain deeper insights into user perceptions of AI assistants. The analysis is based on user-generated reviews collected from the Google Play Store for the Android versions of ChatGPT, Gemini, and Perplexity. The review dataset covers the period from the launch of each respective application until 7th September 2025.

The analysis is confined to user perceptions of usefulness, usability, and learning support features of these AI assistants, as reflected in user-generated reviews. The study does not evaluate technical performance metrics or subscription models of the applications, focusing instead on how users perceive their effectiveness as tools for learning and research.

Data analytics were performed using the Appbot (https://appbot.co/) [16] software, which captures, monitors, measures, and analyzes app reviews over a specified period. Appbot employs Artificial Intelligence algorithms to generate structured insights using a wide range of data-mining and sentiment analysis features, including reviews, ratings, sentiment distribution, keywords, phrases, topics, and language analysis.

In total, ChatGPT received 2,682,043 reviews with an average rating of 4.5 stars, Gemini collected 741,101 reviews with an average rating of 4.2 stars, and Perplexity gathered 96,730 reviews with an average rating of 4.4 stars. To classify the sentiment of each review, Appbot assigns a sentiment score ranging from 0 to 100 percent and categorizes reviews into positive, negative, or neutral sentiment groups.

The analysis incorporates descriptive statistics, including total review counts, sentiment distribution, frequently occurring words, and thematic patterns. The mixed-method approach allows for numerical comparison across platforms while also enabling qualitative interpretation of user feedback, thereby facilitating a holistic comparison of the three AI assistants as perceived by learners and researchers.

Sentiment analysis, also known as opinion mining, is a Natural Language Processing (NLP) technique used to identify and interpret the emotional tone embedded within textual data. By classifying user opinions as positive, negative, or neutral, sentiment analysis provides insights into user attitudes, experiences, and expectations [15]. The findings derived from this analysis offer value to multiple stakeholders by informing developers about areas for improvement, assisting service providers in optimizing user engagement strategies, and enabling users to better understand how concerns related to speed, reliability, and subscription limitations influence overall satisfaction and experience.

Discussion

To summarize key differences in design, capabilities, and user interaction, Table 1 presents a comparative analysis of ChatGPT, Gemini, and Perplexity AI based on existing literature.

Table 1

Comparative Analysis of Key Features and Capabilities of ChatGPT, Gemini, and Perplexity AI

S N	Features	ChatGPT	Gemini	Perplexity
i.	Informational Output	Excels in producing innovative text-based content such as essays, poems, scripts, and code.	Generates accurate, up-to-date content in text, images, and code, integrating visual and textual information.	Produces reliable summaries and integrates content from text, images, and videos.
ii.	Developer and origin	Developed by OpenAI, a leading AI research company.	Developed by Google DeepMind.	Created by Aravind Srinivas.
iii.	Information Retrieval	Generates responses based on patterns from its training datasets.	Retrieves and analyzes real-time data from Google search to respond accurately to queries.	Skilled in retrieving information from multiple sources and providing well-sourced summaries.
iv.	Transparency	Limited transparency; sources are not explicitly cited, making verification difficult.	Limited transparency; sources from Google search are not always directly cited.	Provides citations for its responses, allowing users to verify accuracy.
v.	Comprehension of Text and Visuals	Strong at understanding textual content.	Proficient in both textual and visual context comprehension.	Effective at understanding textual and visual content.
vi.	Cost and Subscription Options	Free version available; pro version costs $20/ month.	Free version available; pro version costs $20/ month.	AI: Free version available; pro version costs $20/ month or $200/year

Table 1 compares the key features and capabilities of ChatGPT, Google Gemini, and Perplexity AI. All three apps excel in generating informational content, with ChatGPT focusing on innovative text outputs, Gemini integrating both text and visual information, and Perplexity providing well-sourced summaries. They differ in development and origin, with ChatGPT from OpenAI, Gemini from Google DeepMind, and Perplexity created by an individual developer. Information retrieval varies, as ChatGPT relies on training data, Gemini uses real-time Google search, and Perplexity draws from multiple sources with citations. Comprehension of text and visuals is strongest in Gemini and Perplexity, while ChatGPT specializes in text. Transparency is limited in ChatGPT and Gemini, whereas Perplexity offers source citations. All three apps provide free versions and similar subscription options for advanced features.

Table 2

App Store Metrics and Specifications of ChatGPT, Perplexity, and Gemini

S. No.	Features	ChatGPT App	Google Gemini	Perplexity- Ask Anything App
i.	App Size	29MB	2.0MB	38MB
ii.	Current Version	1.2025.231	1.0.795460806	2.53.0
iii.	Released On	21 July,2023	Feb 5, 2024	24 May, 2023
iv.	Updated On	22 August, 2025	15 August, 2025	25 August, 2025
v.	Downloads	500M+	500M+	10M+
vi.	Offered By	OpenAI	Google LLC	Perplexity AI
x.	Ratings	4.5*	4.5*	4.4*
xi.	Reviews	24M	10M	957K
xxx.	App Platform	Android, iOS	Android, iOS	Android, iOS

Table 2 provides an overview of the key specifications and App Store metrics for ChatGPT, Perplexity, and Google Gemini, including app size, version details, release and update dates, downloads, ratings, reviews, and platform availability.

ChatGPT

ChatGPT (Chat Generative Pre-trained Transformer), developed by OpenAI, is a widely used AI assistant that employs natural language processing (NLP) and large language models to process and generate human-like text [17]. Accessible through web and mobile applications, it supports diverse users and produces outputs such as essays, articles, emails, code, and social media content, making it a versatile tool [18]. Launched on November 30, 2022, as a research preview based on GPT-3.5, ChatGPT enabled extended, context-aware conversations. Subsequent developments include GPT-4 (March 2023), which enhanced reasoning, problem-solving, and creativity; multimodal GPT-4o (2024) capable of processing text, images, and audio; lightweight variants like GPT-4o mini; and structured reasoning-focused releases such as GPT-4.5 and the o-series (o1, o1-mini). The latest version, GPT-5 (August 2025), integrates advanced reasoning and multimodal efficiency.

Gemini

Gemini, developed by Google, is a multimodal AI assistant capable of processing text, audio, images, and more. Initially launched as Bard in March 2023, it was later rebranded as Gemini and made accessible via web and mobile platforms. Built on Google's large language model research, Gemini supports productivity, creativity, and learning tasks,

including document summarization, coding assistance, content generation, and explaining complex concepts. Its multimodal capabilities allow real-time image analysis and contextual insights, positioning it as a versatile assistant for academic and professional use. It is available both as a web-based service and as a mobile app [19].

Perplexity AI

Perplexity AI is an AI-powered search engine designed to provide accurate, real-time answers in a conversational format. Available on web and mobile applications, it leverages large language models to interpret user queries, generate natural language responses, provide source citations, and suggest follow-up questions [20]. Unlike traditional search engines, Perplexity emphasizes contextual understanding and interactive query refinement, offering users a more personalized and efficient search experience.

Table 3

Rating wise Analysis (AppBot Data)

Metric	ChatGPT	Gemini	Perplexity
5-Star Reviews	2,099,470	520,227	71,485
4-Star Reviews	237,630	65,025	10,642
3-Star Reviews	98,831	33,968	4,182
2-Star Reviews	50,481	21,324	2,109
1-Star Reviews	195,631	100,559	8,312

Table 3 presents the distribution of user ratings for ChatGPT, Gemini, and Perplexity, providing a clear overview of how users perceive each app based on their reviews. ChatGPT demonstrates the strongest positive reception, with 2,099,470 five-star reviews (78%), followed by 237,630 four-star reviews (8.9%). Mid-level ratings are fewer (3.6% at three stars) and only 7.3% of reviews are one-star, indicating that the majority of users are highly satisfied, with comparatively low dissatisfaction.

Gemini reflects a more mixed response. Although 520,227 reviews (70%) are five-star, a substantial 100,559 reviews (13.6%) are one-star, suggesting higher polarization in user opinions. Four-star and three-star reviews account for 8.8% and 4.6%, respectively, while two-star reviews make up 2.9%, pointing to a more varied user experience.

Perplexity records fewer total reviews but shows a relatively stable pattern. About 71,485 reviews (73.9%) are five-star, followed by 11% four-star and 4.3% three-star ratings. The share of one-star reviews is 8.6%, comparable to ChatGPT, while two-star reviews remain low at 2.2%. This reflects steady satisfaction, with fewer extreme negative responses than Gemini.

Table 4

Sentiment Analysis View (AppBot Data)

Sentiment Analysis	ChatGPT (Response)	Gemini (Response)	Perplexity (Response)
Positive Sentiment	2,174,946 (81%)	546,106 (74%)	76,110 (79%)
Neutral Sentiment	154,594 (6%)	44,367 (6%)	5,876 (6%)
Mixed Sentiment	135,239 (5%)	38,528 (5%)	4,875 (5%)
Negative Sentiment	217,264 (8%)	112,100 (15%)	9,869 (10%)

Table 4 presents the sentiment distribution of user reviews, illustrating how users perceive ChatGPT, Gemini, and Perplexity in terms of positive, neutral, mixed and negative feedback ChatGPT receives the highest proportion of positive sentiment at 81% (2,174,946 reviews), indicating strong approval from the majority of users. Negative sentiment is relatively low at 8% (217,264 reviews), while neutral and mixed responses together make up 11%, showing that only a small portion of users express uncertainty or balanced views. This suggests a broadly favorable reception, with limited dissatisfaction.

Gemini shows greater variability in feedback. Although 74% (546,106 reviews) are positive, it records the highest negative sentiment at 15% (112,100 reviews) among the three apps. Neutral and mixed sentiments remain steady at 6% and 5%, respectively. The higher negative share indicates that a significant portion of users encountered issues or unmet expectations despite overall strong adoption.

Perplexity presents a relatively stable sentiment profile. Around 79% (76,110 reviews) are positive, while negative sentiment accounts for 10% (9,869 reviews). Neutral (6%) and mixed (5%) reviews are consistent with the other apps. Although its dataset is smaller, the sentiment balance suggests that users generally appreciate its performance, with fewer strongly negative responses compared to Gemini.

Sentiment score

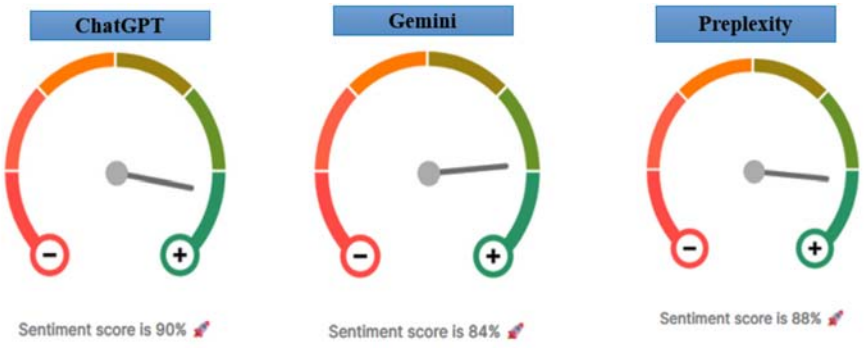


Figure 1

User Sentiment Scores Across ChatGPT, Gemini, and Perplexity (AppBot Data)

Sentiment scores in figure 1 indicates how users feel about a m-app. Higher percentage reflect stronger positive sentiment. ChatGPT records the highest score at 90%, showing strong trust and approval. Perplexity follows with 88%, suggesting generally positive feedback despite some critical comments. Gemini scores 84%, slightly lower but still largely positive, notable given its smaller user base. All three AI assistants are received positively by users. The scores show variation in strength of approval. Overall, user interactions are favorable across all platforms. These results highlight general trust and appreciation for their performance.

Review volume of AI Assistants: ChatGPT, Gemini and Perplexity



Figure 2

Comparison of Review Volumes for ChatGPT, Gemini, and Perplexity (AppBot Data)

Review volume in figure 2 indicates the total user engagement through submitted reviews over a specific period. Higher review volume generally indicates broader usage or attention. ChatGPT shows the largest cumulative review volume, with 2,688,924 reviews averaging 39,543 per month. The timeline from February 2020 to September 2025 shows a slow start until late 2022, followed by a sharp surge, indicating rapid adoption. Gemini records 748,154 reviews, averaging 5,583 per week, with steady growth from early 2023 and occasional spikes suggesting events or updates. Perplexity has the smallest dataset, 97,162 reviews averaging 2,429 per month, with gradual growth from June 2022 to early 2024, accelerating slightly before September, indicating a niche user base.

Language Breakdown of Reviews

The language distribution of user reviews in figure 3 shows significant variation across ChatGPT, Gemini, and Perplexity, reflecting differences in adoption patterns. ChatGPT generated the highest number of English reviews, with 1,324,821 reviews (49.30%), but also shows a relatively diverse linguistic spread. Substantial portions of reviews appear in Spanish, Portuguese, Arabic, Indonesian, and French, highlighting its global reach and

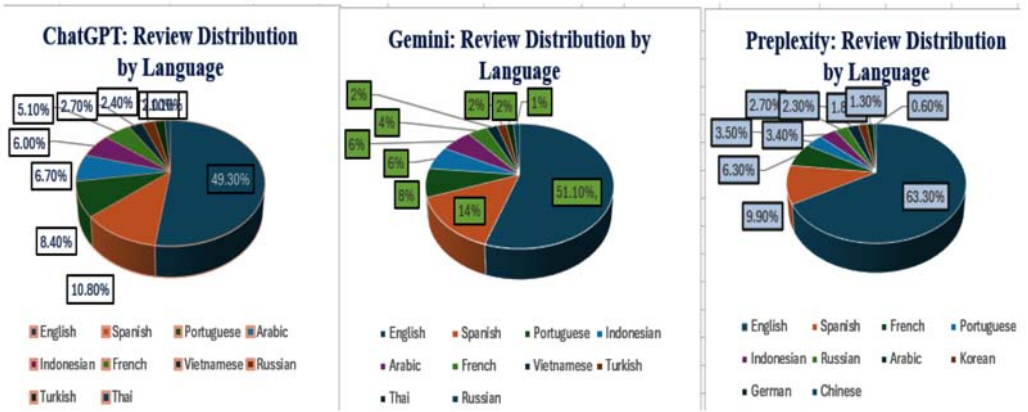


Figure 3

Language Distribution of User Reviews Across ChatGPT, Gemini, and Perplexity (from AppBot Data)

multilingual adoption. Gemini recorded 382,447 English reviews (51.10%), slightly higher in proportion compared to ChatGPT, though the overall volume is smaller. Similar to ChatGPT, Gemini's review base is also distributed across multiple languages, but English maintains a clear majority share. Perplexity, in contrast, is the most English-dominant, with 61,572 reviews (63.30%) in English. Non-English reviews, including French and Spanish, form only a minor share, indicating that Perplexity's adoption is more concentrated among English-speaking users.

Word cloud

A word cloud is a visual representation of text data where the frequency of word usage determines the size of each term displayed. Words that appear more often in user reviews are shown in larger fonts, while less frequent words appear smaller. In this way, the word cloud quickly highlights the most dominant themes and sentiments expressed by users. Although the colors have no meaning in this context, the interactive function allows users to hover over each word to see the exact number of reviews in which it appears, and clicking a word filters the reviews containing that term. This makes word clouds a useful exploratory tool for identifying recurring opinions and concerns in large volumes of textual data.

The ChatGPT app reviews in Figure 4 show a strongly positive global sentiment, with the largest words being "buena" (Spanish: good), "bagus" (Indonesian: good), "sangat" (Indonesian: very), "mejor" (Spanish: better), "ótimo" (Portuguese: great), and "membantu" (Indonesian: helpful), which emphasize that users across different languages consistently describe the app as good, helpful, and better than alternatives. Other frequent mentions such as "ayuda" (Spanish: help), "ajuda" (Portuguese: help), "study", "conversation", and "answer" show that people value it for learning, problem-solving, and communication. Features like "image" and "photo" also appear prominently, suggesting high interest in

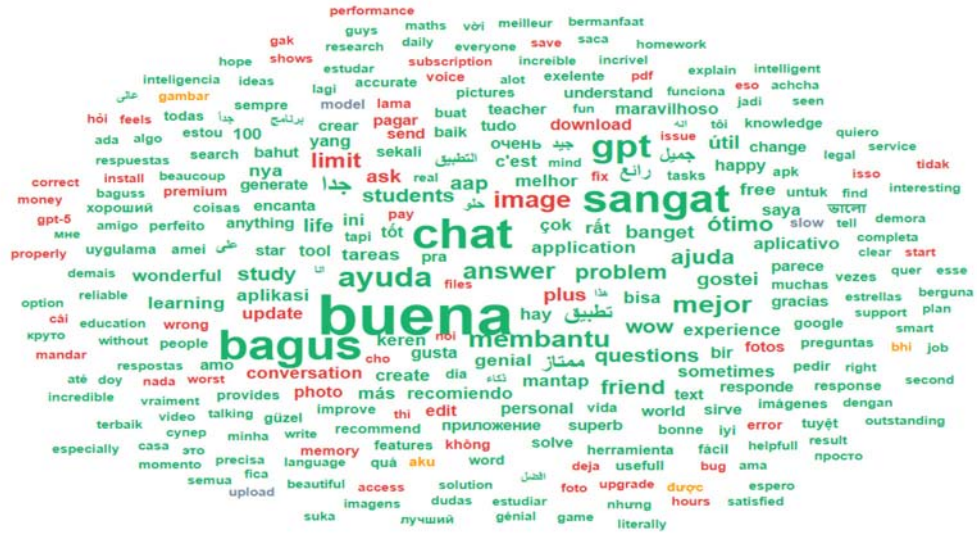


Figure 4

ChatGPT Word Cloud Highlighting Frequently Mentioned Terms in User Reviews (AppBot Data)

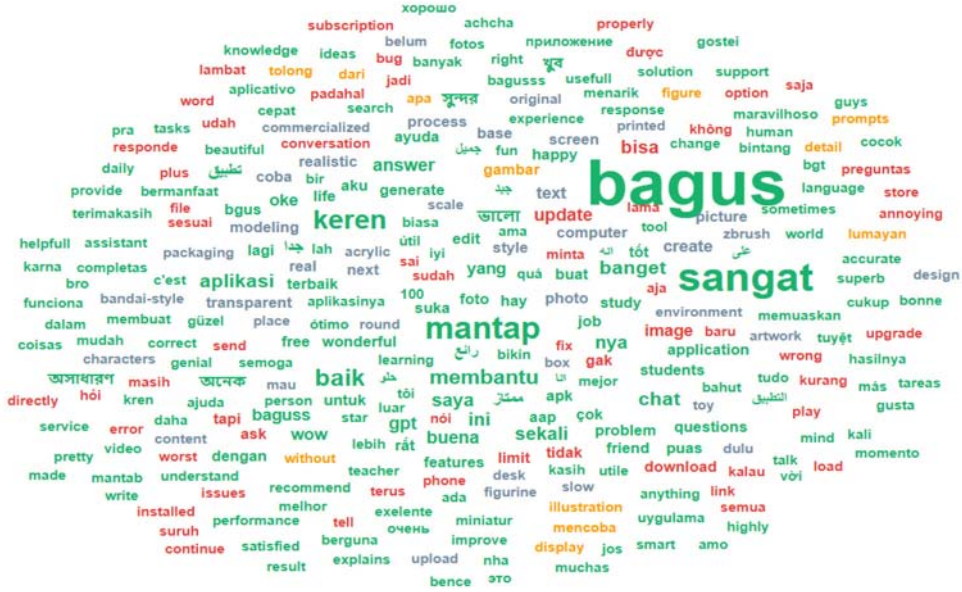


Figure 5

Gemini Word Cloud Highlighting Frequently Mentioned Terms in User Reviews (AppBot Data)

visual generation and editing. Medium-sized words like "recomiendo" (Spanish: I recommend), "gostei" (Portuguese: I liked), and "mantap" (Indonesian: awesome) reinforce the positive adoption. However, smaller words such as "limit", "subscription", "premium", "pagar" (Spanish: to pay), "slow", "issue", and "error" reflect concerns about restrictions, cost, and performance.

Overall, the reviews highlight ChatGPT's global appeal and usefulness in study, help, and creativity, while also pointing to common frustrations with speed and subscription limits.

The reviews for the Gemini app also highlight a mix of strong positives and some negatives in figure 5. The most frequent words are "bagus" (Indonesian: good), "sangat" (Indonesian: very), "mantap" (Indonesian: awesome), "baik" (Indonesian: good), "membantu" (Indonesian: helpful), and "keren" (Indonesian: cool), showing that a large portion of users describe the app as good, helpful, and impressive. Other frequent mentions like "answer", "aplikasi" (application), "chat", "image", "create", and "questions" suggest users value the app's chatting, problem-solving, and image features. Medium-sized positive expressions include "ótimo" (Portuguese: great), "ajuda" (Portuguese: help), "ayuda" (Spanish: help), "gostei" (Portuguese: I liked), "wow", and "genial" (Spanish: great), showing cross-language appreciation.

On the other hand, smaller but visible words highlight pain points: "limit", "subscription", "slow", "lambat" (Indonesian: slow), "bug", "error", "issue", "download",

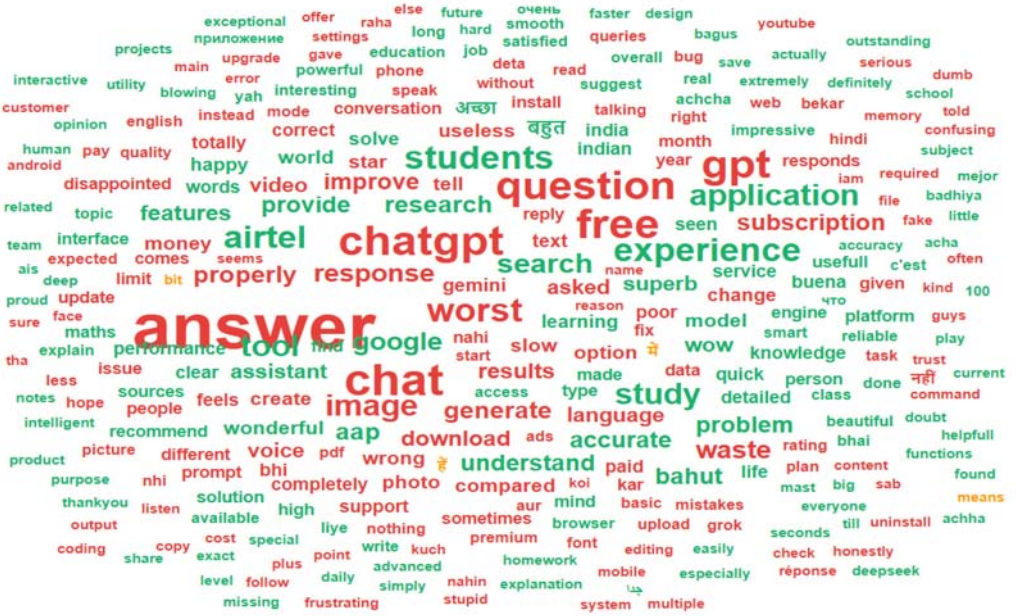


Figure 6

Perplexity Word Cloud Highlighting Frequently Mentioned Terms in User Reviews (AppBot Data)

"commercialized", "pagar" (Spanish: to pay), which point to complaints about speed, bugs, paywalls, and performance. Negative words like "annoying", "worst", and "problem" also appear, though less frequently.

Overall, Gemini reviews emphasize positivity around helpfulness, creativity, and usability, but users still express frustrations with speed, restrictions, and monetization.

The reviews for Perplexity in figure 6 shows a mixed balance of praise and criticism. The most frequent words are "answer", "question", "chatgpt", "students", "gpt", "application", "experience", "free", "search", "response", and "tool", highlighting that users see Perplexity primarily as a Q&A, research, and student-assistant platform. Other large words such as "image", "study", "accurate", "problem", "generate", "language", "knowledge", and "understand" show appreciation for its accuracy, research support, and study help.

Medium-sized positive expressions include "superb", "wonderful", "support", "improve", "recommend", and "wow", reflecting strong approval among many users. However, smaller but notable negatives are frequent: "worst", "waste", "useless", "subscription", "slow", "wrong", "poor", "problem", "issue", "ads", "uninstall", and even provider-related mentions like "airtel" (likely tied to connectivity). These indicate frustrations with speed, errors, ads, paywalls, and inconsistent experiences.

Overall, Perplexity reviews portray it as a powerful tool for students, search, and Q&A accuracy, but reliability, monetization, and user experience issues limit satisfaction for some.

Major Findings and Analysis

The comparative analysis of ChatGPT, Gemini, and Perplexity demonstrates distinct patterns in user adoption, satisfaction, and engagement. ChatGPT emerges as the dominant platform, leading in both volume and positive perception. It accounts for the largest share of five-star reviews (78%) and the highest sentiment score (90%), reflecting strong user trust and widespread approval. Its global adoption across multiple languages further underscores its mainstream reach and utility in study, creativity, and problem-solving contexts. However, users report recurring frustrations related to speed and subscription limits, indicating areas for improvement.

Gemini shows steady engagement but presents a more polarized response. While it maintains a relatively high proportion of positive reviews (70% five-star, 74% positive sentiment), it also records the highest share of one-star reviews and negative sentiment (15%), highlighting a subset of dissatisfied users. Feedback emphasizes its helpfulness, creativity, and usability, though users express concerns regarding speed, restrictions, and monetization. This suggests that Gemini's potential for growth depends on addressing these limitations while expanding its user base.

Perplexity reflects a smaller but consistent niche following, with 73.9% five-star reviews and 79% positive sentiment. It is particularly appreciated for accuracy, search, and student support, yet challenges related to reliability, monetization, and user experience limit overall satisfaction. Its primarily English-centric adoption contrasts with the multilingual reach of

ChatGPT and Gemini, pointing to potential opportunities for expansion in non-English markets.

Across all three platforms, the word cloud analysis highlights recurring themes: users value helpfulness, learning support, and creativity, while common frustrations include slow performance, subscription limits, and technical issues. Taken together, these findings indicate that AI assistants are broadly viewed favorably, with ChatGPT leading in adoption and trust, Gemini offering solid satisfaction with some polarization, and Perplexity serving specialized needs while facing some user experience challenges.

Library-centric mobile applications increasingly function as extensions of academic library services by enabling seamless, anytime-anywhere access to scholarly resources and research support tools through mobile platforms. Beyond facilitating information access, these applications support core academic activities such as literature discovery, reference management, and engagement with digital scholarly content. Their growing adoption reflects changing user expectations for immediacy, flexibility, and continuity in information access, prompting libraries to integrate mobile technologies as part of their digital service infrastructure [21]. In response to these evolving expectations, libraries promote mobile applications to enhance accessibility and service relevance within mobile-driven academic environments [22].

Limitations

This study is limited to reviews collected from the Google Play Store, and therefore does not account for user feedback from the Apple App Store or other platforms. As a result, the findings may reflect patterns specific to Android users, which could differ in scale, preferences, or experiences from those of iOS users. Future research may address this limitation by incorporating multi-platform datasets to provide a more comprehensive view of user perceptions.

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Conclusion:

This study demonstrates that ChatGPT, Gemini, and Perplexity have become integral tools for information seeking, problem solving, and learning, as reflected in their widespread use and generally positive user feedback. ChatGPT leads in terms of adoption and satisfaction, Perplexity offers consistent reliability within a smaller user base, while Gemini reflects both strong appreciation and notable dissatisfaction. Despite differences in scale and sentiment, all three assistants highlight the potential of generative AI to

supplement knowledge services, provided that challenges of accuracy, speed, affordability, and transparency are addressed. Overall, the study provides a comparative summary of how users perceive leading AI assistants based on large-scale sentiment data, offering empirical evidence of their strengths, limitations, and emerging roles in education and research environments.

From a library science perspective, the study's findings closely align with Ranganathan's Five Laws of Library Science. The accessibility of AI assistants reflects the First Law, "Books are for use," by extending knowledge beyond traditional library resources. Their ability to provide personalized responses embodies the Second Law, "Every reader his or her book," while the diversity of platforms and assistants demonstrates the Third Law, "Every book its reader," by serving distinct audiences. Users' appreciation of speed and efficiency highlights the Fourth Law, "Save the time of the reader." Finally, the recent updates of ChatGPT, Gemini, and Perplexity in August 2025 illustrate the Fifth Law, "Library is a growing organism," showing how these AI tools continuously evolve in functionality, scope, and global reach. Together, these parallels underscore that AI assistants not only complement traditional information services but also strengthen the evolving role of libraries in a digital society.

The practical implications of this study are significant for librarians, educators, and academic institutions, as the findings can inform evidence-based decisions regarding the adoption, integration, and responsible use of AI assistants to support learning, research, and library services.

At the same time, the study has certain limitations. It relies on user reviews from the Google Play Store, which may reflect subjective opinions and may not capture the experiences of users across all platforms or institutional contexts. Future research may extend this work by incorporating multi-platform review data, longitudinal sentiment analysis, or qualitative methods such as interviews and surveys to gain deeper insights into user expectations and ethical concerns.

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