CHATGPT IN HIGHER EDUCATION: A SEMIOTICS INVESTIGATION BETWEEN CULTURAL EXPLOSION AND ENCYCLOPEDIC KNOWLEDGE

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Abstract

Generative Artificial Intelligence, and particularly ChatGPT, today represents a crucial moment in the evolution of knowledge production and dissemination in education, echoing what Juri Lotman describes as a "cultural explosion." As AI-generated texts flood academic and creative spaces, the question arises today is: how does this affect research methodologies and pedagogical frameworks? This paper explores the transformative role of ChatGPT in higher education, positioning it as both a disruptive force and an innovative collaborator in the knowledge-making process. Through the perspective of semiotics and Umberto Eco's "encyclopedic model", ChatGPT's functioning mirrors human interpretative processes – drawing upon a vast corpora of texts, identifying patterns, and generating plausible continuations within cultural discourse. However, unlike human scholars, ChatGPT lacks intentionality, challenging traditional epistemological models which rely on

Digital Age in Semiotics & Communication, Vol. VIII, 2025, 206–226
https://doi.org/10.33919/dasc.25.8.11

authorial agency and context-dependent inference. This research investigates how ChatGPT's generative capacities align with the rhizomatic structure of knowledge, where meaning is not linear but formed through a dynamic network of associations. However, today in higher education ChatGPT is redefining the role of teachers and learners, transforming classrooms into dialogic spaces where GenAI acts as a semiotic mediator rather than a mere tool. By facilitating inferential learning – where students engage critically with AI-generated outputs – teachers can cultivate deeper meta-cognitive awareness. In order to investigate how students engage with ChatGPT as a semiotic mediator in education, this study employs a mixed-methods approach, integrating qualitative analysis with a quantitative survey. The qualitative phase explores the perceptions of students regarding the role of AI in learning through a semiotic investigation, examining its impact on meaning-making, epistemological challenges, and pedagogical transformation. The quantitative phase consists of a survey conducted among university students across different departments (N=20). It assesses ChatGPT usage patterns, trust levels, critical evaluation behaviors, and concerns regarding misinformation and institutional regulation. The survey findings reveal that while students frequently use ChatGPT for learning and academic purposes, they exhibit a balanced approach of trust and skepticism – engaging in critical cross-checking of AI-generated content. Despite recognizing ChatGPT's efficacy in simplifying complex topics, students do not widely use it for deep cognitive engagement or reflective academic discussions. Concerns over bias and misinformation remain significant, and while many acknowledge the need for institutional guidelines, there is also a prevailing optimism about GenAI's future role in education. These findings suggest that ChatGPT is perceived not as a replacement for traditional learning structures, but as a tool requiring critical literacy and careful mediation. This paper argues that rather than replacing human intellectual labor, ChatGPT nowadays amplifies the cultural explosion by accelerating the translation of knowledge, making higher education both more accessible and more complex than ever before.

Keywords:
GenAI; Cultural Explosion; Encyclopedic Knowledge; ChatGPT in Higher Education; Semiotic Translation

1. Introduction

The advent of Generative Artificial Intelligence (GenAI) has precipitated a paradigm shift in knowledge production and dissemination across various

domains (Henriksen et al. 2025). Among these GenAI models, ChatGPT has emerged as a prominent tool, capable of generating human-like text based on vast datasets. This development has profound implications – not only for common daily purposes – for academic research and higher education (Haim et al. 2025), prompting a reevaluation of traditional methodologies and pedagogical practices. GenAI refers to a class of artificial intelligence models designed to create new content, including text, images, and audio, by learning patterns from existing data. These models, particularly Large Language Models (LLMs) such as ChatGPT, have demonstrated remarkable proficiency in generating coherent and contextually relevant text, thereby influencing various facets of knowledge production. In the realm of academic research in higher education, GenAI has been harnessed to expedite literature reviews, synthesize research findings, and even generate hypotheses (Hofeditz et al. 2025). For example, Google's development of an AI "co-scientist" is aimed at accelerating biomedical research by identifying knowledge gaps and proposing novel scientific ideas (Weng et al. 2025). Similarly, platforms like Semantic Scholar use AI to provide concise summaries of scholarly papers, enhancing accessibility and comprehension (Kirstein et al. 2025).

However, the integration of GenAI into academic workflows is not without challenges. Concerns have been raised regarding the potential for AI-generated content to introduce biases, inaccuracies, and ethical dilemmas. A study highlighted the fact that GenAI models like ChatGPT can produce fabricated or misleading references, posing risks to the integrity of scientific literature (Alkaissi & McFarlane 2023; Ambrosio et al. 2023). Moreover, the proliferation of AI-generated content has led to debates about the authenticity and originality of scholarly work, as exemplified by discussions on GenAI's role in legal scholarship (Sloan 2025), fostering an explosive – digital – culture.

Juri Lotman, a seminal figure in semiotics, introduced the concept of a "cultural explosion" to describe periods of rapid and transformative change within cultural systems (Lotman 2009). According to Lotman, such explosions result in the accelerated creation and dissemination of new information, leading to a reconfiguration of existing cultural paradigms:

> We are immersed in the space of language. Even in the most basic abstract conditions, we cannot free ourselves from this space, which simply envelops us, and yet it is a space of which we are also a part and which, simultaneously, is part of us.
>
> (Lotman 2009: xiii)

Today the emergence of GenAI can be viewed through Lotman's cultural explosion. AI-generated content has inundated various cultural and academic spaces, challenging traditional notions of authorship, creativity, and intellectual authority. The sheer volume and speed at which GenAI can produce content mirror the dynamics of a cultural explosion, necessitating a reevaluation of how knowledge is constructed and validated in the digital age. This phenomenon has prompted scholarly discourse on the implications of GenAI in culture and society. Such discussions underscore the transformative impact of ChatGPT and similar tools on cultural processes and the urgency of developing frameworks to understand and manage this impact. In light of these developments, this study seeks to address the following unsolved research question: How does ChatGPT influence higher education research methodologies and pedagogical practices? This inquiry aims to elucidate the dual role of ChatGPT as both a disruptive force and an innovative collaborator in the realms of research and education. In order to analyze the impact of ChatGPT, this study uses a semiotic framework, based on Umberto Eco's encyclopedic theory of knowledge, which defines culture as an interconnected network of signs and meanings, in which each element derives its meaning from its relations within the system (Eco 1984). This model provides a context through which to examine how ChatGPT, as a GenAI tool, processes and produces text by navigating a vast corpora of information, identifying patterns, and generating contextually plausible continuations. By mirroring human interpretative processes, ChatGPT engages in a form of semiotic translation, converting input data into meaningful outputs within specific cultural and contextual frameworks. However, unlike human agents, ChatGPT operates without intentionality – or consciousness – raising questions about the nature of meaning-making and the role of authorial agency in AI-generated content. A semiotic analysis facilitates a deeper understanding of these dynamics, offering insights into the epistemological and ethical considerations of integrating GenAI into academic and higher educational practices.

2. Theoretical Framework

The integration of GenAI into academic and educational spheres necessitates a theoretical framework to comprehend its multifaceted impact. This section examines Juri Lotman's concept of the cultural explosion and Umberto Eco's encyclopedia theory of knowledge, providing a standpoint to analyze ChatGPT's role in contemporary knowledge production and dissemination.

Juri Lotman introduced the notion of the cultural explosion to describe periods of rapid and transformative change within cultural systems. In his seminal work, *Culture and Explosion*, Lotman posits that cultural evolution is not a steady, linear process but is characterized by sudden, discontinuous shifts which redefine societal norms and values (Lotman 2009). Lotman's theory challenges the traditional view of gradual cultural development by emphasizing the role of unpredictable events that catalyze significant transformations. He argues that these explosive moments are integral to the dynamic nature of culture, serving as catalysts for innovation and the reconfiguration of existing structures.

This perspective aligns with the current proliferation of GenAI technologies which have rapidly permeated various sectors. This has led to a reevaluation of established practices and epistemologies. The relevance of Lotman's cultural explosion in the context of GenAI is evident in the accelerated integration of AI-generated content into daily life. The sudden ubiquity of tools such as ChatGPT has disrupted traditional modes of communication, creativity, and information dissemination, prompting both enthusiasm and concern regarding their long-term implications. This phenomenon exemplifies Lotman's assertion that cultural explosions, while disorienting, are pivotal in driving societal progress and adaptation:

> To the contemporary man, explosion as a phenomenon [...] has come to be associated with ideas of devastation and has turned into a symbol of destruction. But if, at the core of our contemporary representations, there lay the kind of associations that existed during periods of great openness such as the Renaissance or in art in general then our understanding of the concept of explosion would evoke in us such phenomena as the birth of a new living creature or any other creative transformation of the structure of life.
>
> (Lotman 2009: 19)

Umberto Eco offers a complementary perspective through his concept of the encyclopedia in semiotic theory. Eco envisions the encyclopedia as a multidimensional space of semiosis – a complex system of shared knowledge which governs the production and interpretation of signs within communicative contexts (Desogus 2012). This model underscores the interconnectedness of cultural codes, experiences, and texts, suggesting that meaning is derived from the intricate web of associations within a cultural framework. In Eco's view, the encyclopedia is not a static repository of in-

formation but a dynamic, evolving network which reflects the collective understanding of a community. It encompasses the totality of knowledge, including denotations, connotations, and cultural nuances, thereby facilitating the interpretation of signs in a context-dependent manner (Eco 1984). This perspective is particularly pertinent in analyzing GenAI models such as ChatGPT which operate by drawing upon vast datasets to generate contextually relevant outputs.

Eco's model also addresses the interpretative processes involved in semiosis, highlighting the role of the "Model Reader" – an ideal interpreter equipped with the necessary cultural and contextual knowledge to decode texts as intended by the author: An open text outlines a "closed" project of its Model Reader as a component of its structural strategy (Eco 1979: 9). In the case of AI-generated content, the absence of an intentional author raises questions about the applicability of this concept, prompting a reevaluation of interpretative frameworks in the age of artificial – knowledge – intelligence.

Integrating Lotman's and Eco's theories provides a comprehensive framework for examining the impact of ChatGPT on contemporary culture and higher education. On the one hand Lotman's concept of the cultural explosion elucidates the disruptive yet transformative potential of GenAI technologies, framing them as catalysts for rapid cultural evolution. On the other, Eco's encyclopedic model offers insights into the mechanisms of meaning-making in AI-generated content, emphasizing the importance of contextual and cultural knowledge in interpretation. By synthesizing these perspectives, we can better understand how ChatGPT functions within the semiosphere: the semiotic space where cultural exchanges occur (Lotman 2005). ChatGPT, as a product of GenAI, contributes to the semiosphere by generating new texts which interact with existing cultural narratives, thereby influencing the continuous evolution of meaning within society. Moreover, this integrated framework allows for a critical examination of the epistemological and ethical implications of GenAI in knowledge production. The absence of intentionality in AI-generated content challenges traditional notions of authorship and authority, necessitating new approaches to evaluating the credibility and validity of information. Additionally, the potential for biases embedded within GenAI models underscores the need for a vigilant and reflective engagement with AI technologies, ensuring that they augment rather than undermine the integrity of cultural and academic practices.

The theoretical insights derived from Lotman and Eco have profound implications for academic research methodologies and pedagogical prac-

tices in the context of GenAI integration. Understanding ChatGPT through the cultural explosion's theory highlights the necessity for adaptability in research approaches, encouraging scholars to embrace innovative methodologies which leverage AI's capabilities while remaining critical of its limitations. Yet, in higher educational settings, Eco's encyclopedic model emphasizes the importance of fostering comprehensive cultural literacy, especially among students. As AI-generated content becomes more prevalent, educators are tasked with equipping learners with the skills to navigate and interpret this information critically. This involves cultivating an awareness of the underlying cultural codes and contexts which shape AI outputs, thereby promoting a more nuanced and informed engagement with technology. Furthermore, the integration of ChatGPT into academic and educational environments necessitates a reevaluation of the roles of teachers and learners. Educators must increasingly be positioned as mediators who guide students in critically engaging with AI-generated content, fostering an environment of inferential learning where learners actively construct meaning through interaction with technology. This shift aligns with contemporary pedagogical models which emphasize collaborative and dialogic learning experiences, preparing students to navigate the complexities of a digitally mediated world. The deployment of ChatGPT and similar GenAI models raises significant ethical considerations which must be addressed within this theoretical framework. The potential for GenAI to generate biased or misleading information necessitates the development of robust evaluative criteria to assess the credibility of GenAI outputs. This involves not only technical solutions, such as refining algorithms to mitigate bias, but also educational initiatives that promote critical digital literacy among users.

3. ChatGPT as a Semiotic Mediator in Education

Beyond serving as mere tools for information retrieval or content generation, ChatGPT can be conceptualized as a semiotic mediator: an entity which facilitates the interpretation and construction of meaning within educational contexts. Semiotics provides a framework for understanding how meaning is constructed and interpreted. It extends beyond mere linguistic structures to encompass the ways in which individuals interact with and derive meaning from their environment, incorporating the cultural, social, and cognitive dimensions (Peirce 1931; Eco 1979). Within educational contexts, semiotic mediation plays a crucial role in facilitating knowledge construction, since it enables learners to navigate, interpret, and internalize information through signs, symbols, and contextual frameworks (Danesi

2007). In particular, Lev Vygotsky's (1978) sociocultural theory underscores the significance of semiotic mediation in cognitive development. He posits that learning occurs through interactions with cultural tools and symbolic systems, such as language, writing – and digital media today – , which structure understanding and problem-solving skills. According to Vygotsky, mediated learning experiences – where an external agent, whether a teacher, peer, or tool, assists in cognitive development – are fundamental in shaping higher-order thinking skills. In this sense, technological advancements, including GenAI-driven systems like in the case of ChatGPT, can be understood as contemporary semiotic mediators that extend beyond traditional instructional materials.

ChatGPT, as a language-based GenAI, operates within this paradigm by generating text with which earners can engage, thereby functioning as a mediator in the learning process. It acts as a dynamic and interactive knowledge source, offering contextualized information which users can interpret, critique, and refine based on their prior knowledge and learning goals (Luckin 2018). Unlike static learning resources such as textbooks, ChatGPT responds to user queries in real time, adapting its outputs to the linguistic and conceptual frameworks embedded in the interaction. This aligns with Eco's (1979) encyclopedia theory, conceptualizing learning as an evolving, networked process of sign interpretation rather than a linear accumulation of facts:

> Since the semantic encyclopedia is in itself potentially infinite, semiosis is unlimited, and, from the extreme periphery of a given sememe, the center of any other could be reached, and vice versa. Since every proposition contains every other proposition, a text could generate, by further semantic disclosures, every other text.
>
> (Eco 1979: 24)

Moreover, the mediation of ChatGPT extends beyond direct knowledge transmission to fostering metacognitive skills. When learners engage in dialogues with GenAI, they are not merely passive recipients of information but active constructors of meaning, evaluating AI-generated content for accuracy, relevance, and coherence (Holmes et al. 2022). This process resonates with the constructivist paradigm of learning which emphasizes active engagement, inquiry-based exploration, and the co-construction of knowledge (Jonassen 1999). ChatGPT's ability to provide alternative explanations, clarify misunderstandings, and simulate Socratic questioning further positions it as a powerful semiotic mediator, capable of guiding learners through complex cognitive landscapes.

However, the effectiveness of ChatGPT as a semiotic mediator is contingent upon the user's critical engagement and digital literacy skills. Unlike human instructors, ChatGPT lacks intentionality and contextual awareness, relying instead on probabilistic modeling to generate responses based on existing textual patterns (Bender et al. 2021). This limitation underscores the importance of fostering GenAI literacy among learners, ensuring that they possess the analytical skills necessary to assess the credibility and validity of AI-generated content (Lee 2021). By integrating ChatGPT as a learning tool (Petrassi 2024) within structured pedagogical frameworks which encourage reflection and critical analysis, educators can harness its potential as a semiotic mediator while mitigating risks associated with misinformation and over-reliance on AI-generated knowledge.

Recent empirical research has investigated the practical applications and implications of ChatGPT in educational settings, highlighting its potential to support learning, enhance engagement, and reshape pedagogical methodologies. Recently, Rezai, Namaziandost, and Hwang (2024) conducted a phenomenological study exploring how ChatGPT facilitates second-language (L2) learning among university students. Their study revealed that the integration of ChatGPT as a learning tool significantly enhanced student engagement and motivation, particularly among learners who previously exhibited lower participation in class activities. The GenAI models provided students with real-time responses to inquiries, enabling them to refine their research questions and develop structured approaches to problem-solving. Furthermore, ChatGPT played a significant role in alleviating teacher workload by automating instructional tasks, such as providing formative feedback and summarizing complex concepts. Educators found that this enabled them to dedicate more time to higher-order instructional strategies, such as fostering discussion and critical analysis (Rezai et al. 2024). These findings align with broader research on AI-assisted education, which suggests that intelligent tutoring systems (ITS) and conversational agents can function as cognitive scaffolding tools, supporting metacognitive processes of students and self-regulated learning (Roll & Wylie 2016). By engaging in iterative dialogue with GenAI, students often refine their understanding of topics through an adaptive learning process, which aligns with constructivist learning theories (Piaget 1954; Vygotsky 1978). However, Rezai, Namaziandost, and Hwang (2024) also caution that over-reliance on AI-generated content may lead to a reduction in students' independent critical thinking abilities if not guided appropriately by educators.

In higher education, the role of ChatGPT has been examined through a variety of empirical studies, particularly in the context of student-Ge-

nAI interaction analytics. Chen et al. (2024) developed StuGPTViz, a visual analytics system designed to analyze student-ChatGPT interactions. This study involved collecting conversational data from 48 university students over the course of a semester, focusing on how students engaged with ChatGPT in different learning scenarios. The results indicated that ChatGPT could effectively support learning by providing personalized assistance, fostering critical thinking skills, and acting as an interactive study aid. Students who engaged with ChatGPT for research-related tasks reported increased confidence in articulating their arguments and structuring their academic writing, particularly when using GenAI as a brainstorming tool (Chen et al. 2024). A key feature of StuGPTViz was its ability to track and assess the quality of GenAI-student interactions, allowing educators to monitor the depth of inquiry and engagement. This feature aligns with ongoing discussions in educational research about the need for transparency and accountability in GenAI-driven learning environments (Holmes et al. 2022). By analyzing patterns in student-GenAI conversations, StuGPTViz provided insights into the types of cognitive processes activated during GenAI-assisted learning. For example, students who asked ChatGPT open-ended questions and engaged in iterative dialogue seemed to exhibit stronger analytical reasoning skills compared to those who used the tool for superficial question-answering tasks (Chen et al. 2024). The effectiveness of GenAI in promoting critical thinking has been a subject of debate. While some studies highlight ChatGPT's ability to enhance inquiry-based learning (Zawacki-Richter et al. 2019), others caution that AI-generated responses may lead to cognitive passivity, if students do not actively interrogate the information provided (Chen & Gong 2025). This underscores the importance of designing GenAI-integrated curricula which encourage students to use ChatGPT as a supplementary rather than a primary knowledge source. In this regard, instructors must play a crucial role in modeling effective GenAI utilization strategies, such as prompting students to critically evaluate AI-generated responses, cross-reference information, and engage in reflective writing exercises. Another significant aspect of GenAI integration in higher education is its potential to address disparities in access to academic support. Traditional tutoring and writing support services often have limitations in terms of availability and accessibility, particularly for students from underrepresented backgrounds (Ren 2023). ChatGPT, as an always-available learning resource, has the potential to democratize access to personalized academic support, particularly for students in large-scale university settings where individualized attention from instructors may be limited. However, issues related to bias, misinformation, and eth-

ical AI use must be addressed to ensure equitable and responsible GenAI deployment in educational institutions (Bender et al. 2021).

The conceptualization of ChatGPT as a semiotic mediator carries significant implications for pedagogical practices and learning outcomes. As a mediator, ChatGPT can facilitate inferential learning, where students engage in critical analysis and interpretation of AI-generated content. This process encourages active learning, since students must assess the relevance and accuracy of the information, integrate it with existing knowledge, and apply it to problem-solving scenarios. However, the integration of ChatGPT into education also presents challenges. Concerns have been raised regarding the potential for GenAI to spread biased or misleading information, which can adversely affect learning if not properly addressed. Educators are thus tasked with guiding students in developing critical digital literacy skills, enabling them to discern and evaluate the quality of AI-generated content effectively (Emdad et al. 2023). Moreover, the use of ChatGPT necessitates a reevaluation of assessment methods. Traditional forms of evaluation may not adequately capture the depth of understanding and critical engagement fostered through interactions with GenAI. Alternative assessment strategies, such as reflective essays and project-based evaluations, may be more appropriate in measuring the learning outcomes associated with GenAI-mediated in higher education.

4. Methodology

This study adopts a mixed-methods approach, combining qualitative analysis and quantitative data collection through a structured survey. The rationale for this approach is to provide a comprehensive understanding of ChatGPT's role as a semiotic mediator in higher education, ensuring that both subjective experiences and measurable trends are captured. A mixed-methods framework allows for triangulation, enhancing the robustness and credibility of the study's findings by validating data through multiple sources (Creswell & Plano Clark 2018). The qualitative component of this study is designed to explore how and why users engage with ChatGPT in educational settings. Through in-depth analysis, this section examines the nature of user interactions, the cognitive and pedagogical implications of GenAI mediation, and the epistemological challenges which arise from integrating ChatGPT into knowledge production. The quantitative component, which follows the qualitative analysis, consists of a structured survey designed to measure users – university students from different degree courses – perceptions, engagement patterns, and attitudes toward GenAI's role in higher education. This dual approach is essential for capturing both

interpretative and empirical dimensions of the purpose of the study. While qualitative analysis provides insights into patterns of meaning-making and critical engagement, the questionnaire facilitates scalability and generalizability, ensuring that the study's findings are not solely dependent on individual cases.

4.1. Qualitative Analysis: ChatGPT as a Semiotic Mediator in Education

The qualitative analysis in this study focuses on user experiences, epistemological concerns, and pedagogical shifts resulting from ChatGPT's integration into higher educational settings. The analysis is structured around the following themes:

4.1.1. Meaning-Making and Inferential Learning

One of the primary functions of ChatGPT as a semiotic mediator is its ability to support inferential learning, wherein students construct meaning through iterative dialogue. Unlike traditional knowledge sources such as textbooks or academic articles, ChatGPT engages users in interactive learning, dynamically responding to queries, refining explanations, and even challenging preconceptions. Research by Chen et al. (2024) suggests that GenAI-mediated interaction fosters deeper engagement when learners critically reflect on responses rather than passively accept them. However, this process is not without limitations – ChatGPT's lack of intentionality and contextual awareness means that users must actively evaluate and cross-reference AI-generated content (Bender et al. 2021). The semiotic implications of this phenomenon align with Eco's (1984) encyclopedic model, where meaning is constructed through an evolving network of associations rather than through fixed interpretations.

4.1.2. Epistemological Challenges: Bias, Authority, and Trust

Another key area of investigation is how university students negotiate trust and authority when engaging with ChatGPT in learning and educational settings. While ChatGPT provides access to vast amounts of synthesized knowledge, it does not "know" in the human sense – it merely predicts plausible text sequences based on probabilistic modeling (Floridi & Chiriatti 2020). This raises epistemological concerns regarding intellectual authority and the credibility of AI-generated knowledge. Several studies (Alkaissi & McFarlane 2023) have noted that users often perceive ChatGPT's outputs as authoritative, despite the model's tendency to produce factual errors or "hallucinations." This underscores the semiotic instability of AI-generated content – while ChatGPT provides structured

and coherent responses, its reliability is contingent on external verification and user discernment. Furthermore, as AI-generated knowledge becomes increasingly integrated into academic workflows, there is a growing need to rethink knowledge integrity and citation practices (Dave 2023). Should students be allowed to cite ChatGPT as a source? If so, under what conditions? The semiotic mediation framework suggests that AI should be viewed as a tool for knowledge translation rather than as an independent knowledge authority, reinforcing the importance of human oversight in GenAI-assisted learning.

4.1.3. Pedagogical Transformation: The Role of GenAI in Learning Spaces

From a pedagogical standpoint, the presence of ChatGPT in educational settings has the potential to redefine traditional educator-student dynamics. Studies have shown that educators increasingly view GenAI as a co-facilitator, capable of personalizing instruction, generating discussion prompts, and assisting with formative assessment (Zawacki-Richter et al. 2019).

However, there remains an ongoing debate about the implications of GenAI-driven learning:

- Does GenAI enhance critical thinking by encouraging students to interrogate and refine their understanding?
- Or does it promote cognitive dependency, where students over-rely on AI-generated responses without deeper engagement?

Existing research suggests that the answer depends on how GenAI is integrated into the curriculum. When used as a tool for guided inquiry – where students must evaluate, compare, and contextualize responses – ChatGPT can foster deeper cognitive engagement. However, when used passively, it risks reinforcing surface-level learning, where students accept information uncritically (Holmes et al. 2022).

Thus, ChatGPT as a semiotic mediator does not replace human teachers but instead reframes the educational landscape, shifting emphasis toward critical engagement, digital literacy, and epistemological awareness.

4.2. Quantitative Analysis: Survey About User Perceptions of ChatGPT in Education

The following 10-item survey is designed to measure typical university student engagement, trust, and critical awareness in interactions with ChatGPT. Respondents will rate each statement on a 1 to 10 scale (1 = strongly disagree, 10 = strongly agree). The survey is targeted at frequent

university students (users) of ChatGPT in learning and educational settings.

1. How frequently do you use ChatGPT for educational or academic purposes? (1 = Never, 10 = Daily)
2. How much do you trust the accuracy of the responses of ChatGPT? (1 = Not at all, 10 = Completely)
3. To what extent do you critically evaluate and cross-check the responses of ChatGPT before using them in academic work? (1 = Never, 10 = Always)
4. How much has ChatGPT improved your ability to understand complex topics? (1 = Not at all, 10 = Significantly)
5. How dependent are you on ChatGPT for completing academic tasks? (1 = Not at all, 10 = Completely)
6. How often do you find yourself engaging in deeper discussions or reflections based on the responses of ChatGPT? (1 = Never, 10 = Very frequently)
7. How effective do you think ChatGPT is in supplementing traditional classroom learning? (1 = Not effective, 10 = Extremely effective)
8. How concerned are you about potential biases or misinformation in ChatGPT's responses? (1 = Not concerned, 10 = Extremely concerned)
9. How strongly do you believe that academic institutions should regulate or restrict the use of ChatGPT in coursework? (1 = Not at all, 10 = Strongly agree)
10. How optimistic are you about the future role of AI like ChatGPT in education? (1 = Not at all, 10 = Extremely optimistic)

4.3. Data Integration and Analysis Strategy

This study will employ a sequential explanatory approach, where qualitative insights will be used to inform and contextualize the interpretation of quantitative findings. The integration of data will occur at two levels:

- Survey Design: Themes that emerged from the theoretical framework guided the refinement of survey questions to ensure they captured relevant and meaningful constructs.
- Results Interpretation: After collecting the data, qualitative insights helped me explain patterns, discrepancies, and unexpected trends in quantitative responses.

5. Evaluation of the Survey Results

The survey results, based on responses from 20 university students from various degree programs, provide an initial quantitative assessment of the role of ChatGPT in higher education. Given the anonymity of the participants and the diverse academic backgrounds represented, the findings offer insightful trends regarding usage patterns, trust, critical evaluation, dependency, and attitudes toward GenAI in higher education. A qualitative interpretation of these results reveals both the perceived benefits and the concerns that students associate with ChatGPT.

5.1. Usage Patterns and Trust in ChatGPT

The frequency of ChatGPT use for educational purposes showed a moderate level of engagement, with 25% of respondents selecting 5 on the scale. This suggests that while ChatGPT is an important educational and learning tool for many students, it has not yet reached ubiquitous daily usage among the surveyed group. The trust in ChatGPT's accuracy was moderately high, with 30% of respondents rating it at 6. This indicates that while students generally find ChatGPT reliable, they remain cautious about its accuracy, likely due to known issues such as factual inconsistencies and AI-generated "hallucinations" (Bender et al. 2021).

5.2. Critical Evaluation and ChatGPT's Role in Learning

Encouragingly, 30% of respondents rated their cross-checking behavior at 8, suggesting that a significant portion of students actively verify AI-generated information before using it in academic work. This finding contrasts with concerns that GenAI tools might encourage passive learning – instead, the data suggests that many students maintain a critical stance when interacting with GenAI. However, the perception of ChatGPT's impact on learning complex topics was notably high, with 25% of respondents selecting 10. This highlights that, for some students, ChatGPT serves as an effective supplementary tool that enhances comprehension and engagement with difficult material.

5.3. AI Dependency and Cognitive Engagement

The responses to ChatGPT dependency suggest a more nuanced relationship with AI. The most common response (31.6% selecting 1) indicates that many students do not rely heavily on ChatGPT for basic academic tasks. However, the responses regarding engagement in deeper discussions or reflections were lower, with 30% selecting 2, indicating that ChatGPT is not frequently used as a stimulus for critical discourse or extended intellectual reflection. This suggests that while students benefit from ChatGPT

for immediate information retrieval and clarification, it is less frequently leveraged as a tool for in-depth academic discourse.

5.4. Perceived Effectiveness and Concerns About GenAI in Higher Education

Regarding the effectiveness of ChatGPT in supplementing traditional classroom learning, responses were split between 6 and 7 (20% each), showing a moderately positive perception of GenAI's role in higher education. However, concerns about bias and misinformation were significant, with 35% of respondents selecting 7, indicating that many students remain skeptical about ChatGPT's reliability. This finding underscores the epistemological challenges of integrating GenAI into higher education, where students must balance convenience and accessibility with critical literacy and verification processes (Floridi & Chiriatti 2020).

5.5. Institutional Regulation and Future Optimism

The results also indicate a relatively high level of agreement with academic institutions regulating or restricting ChatGPT usage in coursework, with 20% of participants selecting 8. This suggests that while students recognize the potential of ChatGPT, they also acknowledge the need for academic oversight to prevent misuse or over-reliance. Despite these concerns, the future of GenAI in higher education is viewed optimistically, with 20% selecting 10 when asked about their outlook on the role of GenAI in learning. This optimism likely reflects a growing acceptance of ChatGPT as a transformative educational and learning tool, even as ethical and pedagogical challenges remain.

6. Discussion

From a semiotic standpoint, the survey findings illustrate the complex interplay between trust, skepticism, and meaning-making in university students' engagement with ChatGPT. The balance between reliance and critical evaluation suggests that students do not passively absorb AI-generated knowledge but actively mediate their interactions with the tool, positioning themselves as both users and interpreters within the broader semiosphere (Lotman 1990). The mixed responses regarding trust and regulation reflect the paradox of GenAI as both a facilitator of knowledge expansion and a site of epistemological instability – an idea deeply embedded in Eco's encyclopedic model of knowledge (Eco 1984).

The data reveals that while ChatGPT significantly aids in understanding complex topics (25% rated its impact at 10), students also exhibit a heightened awareness of misinformation, with 35% expressing concerns about

biases (rating 7). This duality resonates with Lotman's theory of cultural explosion (2009) which posits that rapid technological transformations introduce both opportunities and disruptions in knowledge structures. The sudden accessibility of AI-generated responses reconfigures academic engagement, compelling students to renegotiate traditional notions of intellectual authority and credibility. In this sense, ChatGPT functions as a semiotic disruptor – a tool that challenges the stability of traditional knowledge hierarchies by generating content dynamically rather than relying on fixed, institutionalized sources. Eco's encyclopedia theory provides a crucial perspective for interpreting this phenomenon. Unlike conventional knowledge repositories, ChatGPT constructs responses by navigating a fluid network of textual associations, making its outputs inherently context-dependent and probabilistic. Eco (1979) emphasizes that an "open text" allows for multiple interpretations, requiring an active and competent Model Reader to engage in inferential learning. The survey data suggests that students, rather than passively accepting AI-generated information, enact the role of Model Reader by critically evaluating the responses of ChatGPT: 30% rated their cross-checking behavior at 8. This suggests that students recognize the need for contextual verification, mirroring Eco's assertion that knowledge is not merely retrieved but constructed through interconnected associations. However, the relatively low levels of cognitive engagement and discussion generation (30% rated 2) indicate that ChatGPT is not yet fully integrated as a dialogic learning partner. This is significant when viewed through Vygotsky's (1978) concept of semiotic mediation which posits that learning occurs through social and cognitive scaffolding facilitated by external tools. While ChatGPT offers immediate informational support, its ability to foster deep reflective discourse remains limited. This echoes concerns raised in contemporary GenAI literacy studies which warn that reliance on AI-generated content without structured critical engagement may lead to cognitive passivity (Holmes et al. 2022). The ambiguity in the stance of students toward institutional regulation (20% rating 8) further highlights the semiotic instability of AI integration in education. This aligns with Lotman's cultural explosion framework, wherein disruptive technologies necessitate new regulatory mechanisms to re-establish epistemic order. The debate over whether GenAI should be restricted, guided, or fully embraced mirrors historical shifts in media and knowledge systems, where emerging technologies have always triggered concerns over authorship, authenticity, and pedagogical legitimacy.

Despite these uncertainties, students exhibit an optimistic outlook on the future role of GenAI in education (20% rated 10), suggesting that while

current concerns persist, GenAI is largely perceived as a transformative tool rather than a threat. This optimism could be interpreted through Eco's encyclopedic vision which conceptualizes knowledge not as a finite construct, but as an ever-evolving network of signification. ChatGPT, by extending this network, presents both challenges and opportunities in redefining how knowledge is produced, validated, and disseminated within academic environments.

Conclusion

The results of the findings, if analyzed through Lotman's and Eco's semiotic theories, highlight that today ChatGPT functions as a semiotic mediator which simultaneously destabilizes and enriches knowledge systems. Students appear to negotiate meaning actively, balancing trust and skepticism, utility and caution, and engagement and critical distance. However, the survey also underscores that GenAI in higher education remains at a transitional stage, where its role as a collaborative knowledge partner has yet to be fully realized. Moving forward, research should explore how GenAI's semiotic mediation can be leveraged to deepen critical engagement, ensuring that AI-generated knowledge is not merely consumed, but actively interpreted, contextualized, and transformed.

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