

Emotional Engagement with AI Chatbots among Moroccan University Students: A Quantitative Study

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Abstract: In an era of increasing digital mediation, AI chatbots are transcending their functional roles to become emotional anchors for students facing social isolation. This study investigates the affective engagement of 255 French literature students at the École Normale Supérieure (ENS) of Fez, Morocco, exploring how AI fills the void of loneliness. Through a structured quantitative analysis, the research reveals a profound behavioral shift: 43.8% of students interact with AI daily, with 66% seeking refuge in these "digital companions" during moments of peak emotional vulnerability most notably during the solitude of the night (38%).

The findings illuminate a striking paradox of modern connectivity: while 32.7% of participants still experience persistent loneliness, 63% successfully leverage AI for emotional regulation, reporting significant feelings of calmness and relief. Described by users as "supportive listeners" (37.5%), these chatbots are no longer mere tools but active participants in the student's emotional ecosystem. While the study's focus on a single institution and self-reported data suggests a need for broader validation, these results underscore a pivotal transformation in higher education. AI is emerging as a critical, non-judgmental outlet for emotional communication, demanding a re-evaluation of the pedagogical and psychological support structures in the digital age.

Keywords: Artificial Intelligence, Affective Computing, Student Loneliness, Digital Companionship, Emotional Regulation, Moroccan Higher Education.

Résumé : À l'ère d'une médiation numérique croissante, les chatbots d'intelligence artificielle transcendent leur rôle fonctionnel pour devenir de véritables ancrs émotionnelles face à l'isolement social. Cette étude explore l'engagement affectif de 255 étudiants en langue et littérature françaises à l'École Normale Supérieure (ENS) de Fès, analysant comment l'IA comble le vide de la solitude. À travers une analyse quantitative structurée, la recherche révèle une mutation comportementale profonde : 43,8 % des étudiants interagissent quotidiennement avec l'IA, tandis que 66 % y cherchent refuge lors de moments de vulnérabilité émotionnelle aiguë particulièrement durant la solitude nocturne (38 %).

Les résultats mettent en lumière un paradoxe saisissant de la connectivité moderne : si 32,7 % des participants éprouvent encore une solitude persistante, 63 % parviennent à utiliser l'IA comme un outil de régulation émotionnelle, rapportant un sentiment de calme et de soulagement. Décrits par les usagers comme des « auditeurs bienveillants » (37,5 %), ces chatbots ne sont plus de simples outils, mais des acteurs de l'écosystème affectif étudiant. Bien que l'échantillon limité à une seule institution et le caractère déclaratif des données invitent à une validation élargie, ces conclusions soulignent une transformation charnière. L'IA s'impose désormais comme un exutoire non-jugeant, appelant à une réévaluation des structures de soutien pédagogique et psychologique à l'ère du numérique.

Mots-clés : Intelligence Artificielle, Informatique Affective, Solitude Étudiante, Compagnonnage Numérique, Régulation Émotionnelle, Enseignement Supérieur Marocain.

Introduction

Artificial Intelligence (AI) is fundamentally defined as a branch of computer science dedicated to engineering machines and algorithms capable of replicating complex human cognitive functions, such as learning, reasoning, and autonomous decision-making (Rosenberg, 2005). Historically, AI has transitioned from rigid, rule-based symbolic systems to sophisticated connectionist models rooted in neural networks. While early milestones like ELIZA (1966) merely mimicked human dialogue through basic pattern matching (Roll & Wylie, 2016), the recent emergence of Deep Learning has catalyzed the development of Large Language Models (LLMs), such as GPT-4. These contemporary systems generate contextually coherent and emotionally nuanced responses, paving the way for transformative applications in affective computing and educational psychology (Černý, 2022; Marr, 2023).

In higher education, research has predominantly focused on the cognitive and pedagogical utility of AI emphasizing personalized learning paths and adaptive feedback. However, its capacity to mediate students' emotional experiences remains underexplored, particularly within non-Western sociocultural landscapes. In Morocco, university students frequently navigate significant academic pressure alongside limited institutional mental health resources and social norms that may inhibit the open expression of vulnerability. Within this specific milieu, AI-powered chatbots may emerge as "digital confidants" offering a private, non-judgmental, and readily accessible medium for emotional discharge.

To investigate this phenomenon, the present study integrates three complementary theoretical lenses. Attachment Theory (Bowlby, 1969) provides a foundation for understanding the human drive to seek responsive figures during periods of emotional distress. Anthropomorphism Theory (Nass & Moon, 2000) elucidates why individuals project human-like traits onto AI, thereby fostering relational expectations. Finally, Emotion Regulation Theory (Gross, 1998) offers a framework to analyze how interacting with these agents facilitates the expression, management, or cognitive reframing of affects.

Grounded in these perspectives, this research explores the affective engagement of 255 students at the École Normale Supérieure (ENS) in Fez, Morocco. The study specifically examines: (1) behavioral patterns of chatbot utilization, (2) the underlying emotional motivations, and (3) the role of AI in informal therapeutic support or emotional regulation. By centering the emotional dimensions of AI within a Global South context, this work contributes to a more nuanced understanding of human-computer interaction and digital well-being in modern educational settings.

1. Literature Review

1.1 Technological Evolution: From Rule-Based Systems to Generative AI

Artificial Intelligence (AI) is broadly defined as the branch of computer science dedicated to developing systems capable of replicating human cognitive functions—such as reasoning, problem-solving, and decision-making (Rosenberg, 2005). Historically, AI has transitioned from symbolic, rule-based logic to connectionist models grounded in neural networks.

The evolution of conversational agents began with ELIZA (1966), which utilized simple pattern matching to simulate psychotherapeutic dialogue (Roll & Wylie, 2016).

Subsequent developments, such as A.L.I.C.E. (1995) and SmarterChild (2001), gradually improved natural language processing (NLP) and user adoption. However, the true paradigm shift occurred with the advent of Large Language Models (LLMs) like GPT-4. Unlike their predecessors, these models generate context-aware, fluid, and emotionally nuanced dialogue, facilitating their integration into educational and affective computing contexts (Černý, 2022; Marr, 2023).

1.2 The Chatbot Workflow: A Technical Overview

The operational flow of a modern chatbot (Fig. 1) involves several critical stages:

- **Input Processing:** Converting text or voice into data via Natural Language Understanding (NLU).
- **Dialogue Management:** Maintaining context and determining the appropriate response.
- **Response Generation:** Leveraging predefined rules or generative models (e.g., GPT) to produce contextually relevant output.
- **Continuous Learning:** Refining performance based on user feedback and new data clusters.

1.3 Theoretical Frameworks: The Rise of Emotional AI

Students increasingly utilize chatbots as "digital confidants," seeking an emotionally safe space free from social judgment (Nadarzynski et al., 2019). This engagement is interpreted through three primary lenses:

1. **Anthropomorphism:** The innate human tendency to attribute human traits to non-human entities. By simulating empathy, designers increase user retention and relational intimacy (N. Huu Binh, 2014).
2. **Attachment Theory:** Originally formulated by Bowlby (1969), this theory suggests that individuals seek responsive figures during periods of stress. In university settings, chatbots may act as **transitional objects**, providing stable emotional resources when human support is unavailable (Lee, 2023; Li et al., 2024).
3. **Human-Machine Communication (HMC):** Challenging traditional notions of dialogue, HMC examines how the "illusion of presence" influences user behavior, even in the absence of machine intentionality.

1.4 Ethical Challenges and Psychological Risks

The integration of emotional AI into education introduces complex ethical dilemmas. While these tools offer real-time support, they also present significant risks:

- **Emotional Dependence:** Reliance on AI for companionship may lead to parasocial attachments, potentially displacing real-life interpersonal relationships (Yin et al., 2024).
- **Algorithmic Bias:** Systems often inherit biases from their training data, leading to culturally insensitive responses or inequitable treatment of diverse student populations (Abubakar et al., 2023).
- **Data Privacy:** The collection of sensitive emotional data raises concerns regarding informed consent and data management under frameworks like the GDPR (Barhoumi & BenAyed, 2025).

- **Simulated Empathy:** The "deception" of machine-mimicked care raises philosophical questions about the authenticity of mentorship and its impact on students' future social expectations.

Bias and Fairness

AI chatbots, including those used in education, inherit biases from the datasets on which they are trained. This can result in uneven treatment of users, propagation of stereotypes, or culturally insensitive responses (Abubakar et al., 2023). For example, biased feedback in automated writing assessments or tone-deaf emotional responses may reinforce inequality or alienate certain users.

Addressing this issue requires continuous evaluation of training data, algorithmic transparency, and inclusive design practices that consider the diverse experiences and identities of learners (IEEE Spectrum, 2021) .

Authenticity and Simulation of Empathy

Despite their conversational sophistication, chatbots do not possess self-awareness or true understanding. Yet, their ability to imitate human concern may mislead users into perceiving these systems as emotionally aware (Li et al., 2025). This raises questions about the ethics of simulation: Is it ethical to design systems that mimic human care without having any internal emotional state? This question is especially relevant in education, where the distinction between genuine mentorship and algorithmic feedback is critical. If students are consistently exposed to simulated empathy, will it affect their expectations of real human relationships, both inside and outside the classroom?

Inequity and Access

The integration of AI into education introduces a risk of exacerbating the digital divide. Students in under-resourced regions or institutions may lack the infrastructure to benefit from advanced chatbot systems. Moreover, AI systems are often trained primarily in English and based on Western-centric datasets, limiting their accessibility and relevance for linguistically and culturally diverse learners (Wei & Li, 2024).

Ensuring equity requires deliberate strategies to democratize access, adapt tools to local needs, and include marginalized voices in design and evaluation processes.

While AI chatbots offer numerous benefits from real-time support to affective engagement—they also challenge long-held assumptions about pedagogy, identity, and emotional connection. As these systems become more embedded in educational and emotional life, the following questions warrant further investigation:

1. To what extent do students perceive AI chatbots as emotional partners, despite the system lacking consciousness and intentionality?
2. How do students assess the importance of ethical safeguards to prevent emotional over-dependence on AI, particularly among vulnerable populations?
3. To what extent do students perceive chatbot responses as fair and inclusive across different cultural and linguistic contexts?
4. How does interaction with empathetic chatbots influence students' understanding of authentic human relationships?

2. Materials and Methods

2.1. General Background

This research explores the emotional engagement of Moroccan university students with conversational agents, with a particular focus on chatbot use in contexts of solitude, vulnerability, and limited social interaction. The primary objective is to understand how students perceive and interact with these technologies not only as informational tools but as digital companions capable of offering emotional support. This investigation seeks to bridge the gap between emerging AI-driven emotional interfaces and the lived experiences of students, offering a comprehensive analysis of usage patterns, affective motivations, and perceived relational benefits.

By conducting a case study at the Higher Normal School in Fez with a sample of 255 literature students, the research adds critical value by situating chatbot use within a specific cultural and educational environment. This localized perspective is essential, as students' emotional relationships with AI can vary significantly across socio-cultural contexts. The findings have the potential to inform both national and international strategies related to AI integration in educational and psychological support services.

Furthermore, this study contributes to the growing academic discourse on affective computing and AI in education by examining how students emotionally relate to chatbots during moments of stress, loneliness, or self-reflection. As AI tools become increasingly present in learners' personal and academic lives, understanding these affective dynamics is crucial for ensuring their ethical and effective implementation. The research also raises broader questions about emotional outsourcing, digital companionship, and the evolving role of machines in student well-being.

To achieve these objectives, our research employs a rigorous quantitative methodology based on a self-administered online questionnaire. The instrument was composed of 14 structured items organized around three thematic axes: frequency of chatbot usage, emotional motivations, and perceived affective connection. Each item was designed to capture specific dimensions of the student-chatbot interaction, using multiple-choice and Likert-scale formats to ensure clear, unbiased responses. The questionnaire was reviewed by three domain experts and refined through consultations with students to enhance its relevance and contextual accuracy.

The development of the questionnaire prioritized alignment with students' psychological and cognitive frameworks, ensuring that the questions reflected their lived realities and emotional vocabularies. Each response option was carefully crafted to allow for nuanced insight into students' emotional responses, without leading or priming their answers. This design was essential for assessing authentic affective perceptions rather than superficial or performative responses.

By involving students in the instrument refinement process, we ensured strong ecological validity and the ability to collect meaningful, generalizable data.

In summary, this expert-validated and contextually grounded questionnaire served as a robust foundation for capturing how students interact emotionally with chatbots. The study thus offers important insights into how AI systems are becoming intertwined not only with learning processes, but also with the emotional landscapes of students navigating increasingly digital academic environments.

2.2 The sample

Out of the 270 responses collected, 255 were validated, representing 94.4% of the initial sample. These participants were Moroccan students enrolled in French literature programs at the Higher Normal School (École Normale Supérieure - ENS) of Fez, providing a contextually relevant population for the study. The sample spanned three

academic levels first-year (L1), second-year (L2), and third-year (L3) cohorts thereby offering a cross-sectional view of learners at different stages of their undergraduate studies. Regarding demographics, participants were aged between 18 and 24 years, and the gender distribution showed a predominance of female students (71% female, 29% male; see Fig. 1 and Table 1), which is consistent with broader national trends in humanities and language programs. Importantly, all respondents reported regular access to digital technologies, and most had prior experience with AI-driven platforms, particularly chatbots. Their engagement ranged from initial exploratory use to deeper emotional interactions, indicating both familiarity with and receptivity to these tools. It should be noted, however, that the sample was voluntary and convenience-based, which may limit the generalizability of the findings. Nonetheless, the clearly defined and validated sample provides meaningful insights into an emerging and underexplored phenomenon: the emotional use of AI tools in educational contexts where human interactions can be inconsistent, limited, or emotionally unavailable. To further strengthen the robustness of the findings, future research could integrate a mixed-methods approach, such as interviews or focus groups, to complement the quantitative data and provide additional depth.

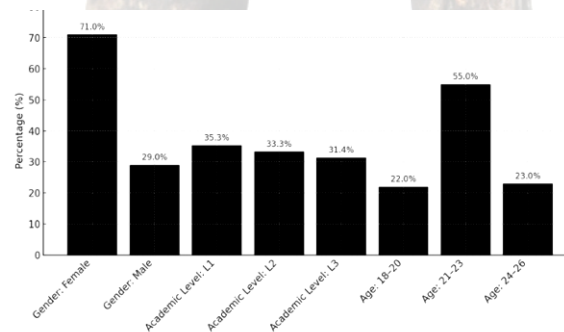


Fig. 1. Demographic Description of Participants

2.3. Instrument and Procedures

The data collection instrument consisted of a structured, self-administered online questionnaire designed to assess students' emotional engagement with chatbots. The instrument comprised 14 items organized into six thematic sections: (1) frequency and context of chatbot use, (2) emotional context of use, (3) emotional experiences during interaction, (4) psychological and affective impact, (5) interpretation of chatbot roles, and (6) overall satisfaction and personal reflections.

Each construct was measured using multiple items to ensure construct validity and to avoid reliance on single-item indicators. For example, to measure emotional motivation, the questionnaire included statements such as *"I turn to chatbots when I feel lonely,"* *"Chatbots make me feel emotionally understood,"* and *"Interacting with chatbots helps me regulate my emotions."* Perceived role was assessed through items like *"I consider the chatbot as a supportive listener"* or *"The chatbot is a tool for learning rather than emotional support."* Responses were rated on a five-point Likert scale, ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Although, content validity was established through expert review: three specialists in AI, psychology, and educational sciences examined the questionnaire's structure, clarity, and relevance. Based on their feedback, some items were reworded for greater precision and several new items were added to better capture emotional and motivational dimensions.

Moreover a pilot study was conducted with 20 students from the same academic context (not included in the final sample) to evaluate item clarity and internal structure. Feedback from pilot participants led to simplification of ambiguous questions and reordering of items to improve flow and coherence. In addition, construct validity was verified using exploratory factor analysis (EFA) to confirm the factorial structure. Reliability analyses indicated good internal consistency, with Cronbach's alpha coefficients above 0.80 for the main subscales, demonstrating strong reliability. Furthermore, regarding ethical considerations, participation in the study was entirely voluntary. All respondents were informed of the research objectives and procedures, and informed consent was obtained electronically before participation. Data collection was fully anonymous, and confidentiality was guaranteed throughout the research process in compliance with ethical research standards

3. Results

The high percentages obtained across several variables provide deep insights into students' emotional, cognitive, and social relationships with chatbots. These findings cannot be understood solely as indicators of technological use; rather, they reveal emerging psychological patterns in digital interaction patterns that mirror classical mechanisms of learning, motivation, and attachment, adapted to the age of artificial intelligence.

The finding as illustrated in Figure 3, 43.8% of students use chatbots on a daily basis demonstrates a remarkable level of cognitive integration and behavioral consistency. According to Vygotsky's Sociocultural Theory (1978), such frequent use indicates that the chatbot has been *internalized* as a cultural and psychological tool one that mediates thinking, problem-solving, and emotional organization.

In this sense, students are not merely *using* chatbots; they are *thinking with* them. The chatbot becomes a *semiotic mediator* within their Zone of Proximal Development (ZPD), assisting them in achieving cognitive operations they could not accomplish alone. The regularity of use reflects the successful transition from *external regulation* (guided assistance) to *self-regulation* (autonomous reasoning), which is central to Vygotskian learning processes.

Furthermore, from Bandura's Social Cognitive Theory (1986), this consistent behavior is evidence of *self-regulated learning*. Students interact with chatbots to test hypotheses, verify understanding, and receive feedback. Each successful interaction reinforces *self-efficacy* the belief in one's capacity to succeed in specific tasks which in turn motivates further engagement. Therefore, the 43.8% daily usage rate is not a trivial number; it is a quantitative reflection of *internalized self-regulation and technological confidence*.

The observed daily usage pattern (43.8%) suggests that students leverage chatbots as adaptive coping mechanisms to navigate contemporary cognitive demands. In the landscape of post-pandemic digital pedagogy—characterized by incessant information flow—chatbots provide essential immediacy, clarity, and structural support. This behavioral trend strongly resonates with Sweller's Cognitive Load Theory (1988): by delegating organizational or repetitive tasks to AI, students effectively mitigate extraneous cognitive load. This delegation allows for the optimization of limited working memory, reallocating mental resources toward germane load and deeper conceptual integration.

Consequently, this 43.8% frequency serves as a robust index of technological internalization. It reflects a shift toward cognitive scaffolding and self-regulatory mastery, where chatbots are no longer peripheral tools but have become integral components of the students' internal architecture for academic reasoning and mental organization.

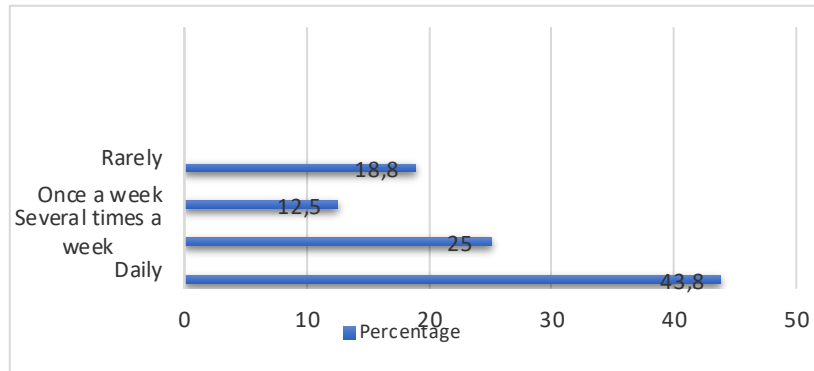


Fig. 2. Frequency and Context of Chatbot Use among Moroccan University Students.

The question “Have you ever conversed with a chatbot (e.g., ChatGPT or similar) when you were feeling down, lonesome, or deserted?” explores the emotional dimension of chatbot interaction among students. It aims to understand whether these tools are used not only for academic support but also as a form of emotional coping or companionship. The results (Fig.4 and Table 4) show that a majority (66%) of respondents who reported using chatbots when feeling lonely, sad, or stressed is particularly revealing. It indicates that chatbots fulfill an *affective function* traditionally reserved for human relationships.

This behavior aligns with Bowlby’s Attachment Theory (1969), which proposes that humans have an innate drive to seek proximity and security in times of distress. In situations where human support is absent or unavailable such as when students face academic or social isolation the chatbot becomes a *substitute attachment figure*. Its constant availability, nonjudgmental responses, and simulated empathy provide *perceived emotional safety*.

The strength of this attachment is reflected in the high percentage itself (66%): it signifies not casual use, but *emotional reliance*. The chatbot satisfies the *need for a secure base*, allowing students to manage anxiety and uncertainty. Furthermore, this finding aligns with Horton and Wohl’s (1956) theory of *parasocial relationships*, in which individuals form emotional bonds with media figures who simulate intimacy. Chatbots, through linguistic and affective mimicry, reproduce this illusion of connection. Students may anthropomorphize the chatbot interpreting algorithmic feedback as genuine empathy. This attachment behavior is reinforced by Nass and Moon’s (2000) work on anthropomorphism: users instinctively apply social rules to machines, especially when they use natural language. Therefore, the 66% figure is not just statistically high—it represents a *psychological adaptation*, showing how technology satisfies the human need for attachment and emotional expression in the absence of real social interaction.

In the Moroccan cultural context, where emotional restraint and modesty often limit open expression, this behavior takes on additional meaning: chatbots become *socially acceptable emotional outlets*, enabling students to express vulnerability without stigma. The 66% thus reflects not technological fascination, but *psychosocial compensation*.

Table 1. Results of the second question

Response Option	Percentage (%)
Yes	66%
No	24%
I'm not sure	10%

The question “When you engage with a chatbot during moments of solitude, what do you usually seek?” investigates the psychological and social drivers behind chatbot use in contexts of loneliness. Another high figure; 63% of students perceiving chatbots as helpful for regulating emotions reveals the emergence of what can be called *algorithmic empathy*: the perception that machines can understand and respond to human emotions effectively.

From the perspective of Cognitive-Behavioral Theory (Beck, 1976), such interactions promote *cognitive restructuring*. When students articulate their emotions to the chatbot and receive logical, structured responses, they are engaging in *guided self-dialogue*. This process helps them reframe negative thoughts, thereby improving emotional clarity and self-awareness.

In addition, Gross’s Emotion Regulation Theory (1998) suggests that expressing emotions verbally—even to an artificial entity—reduces affective intensity through *cognitive reappraisal*. Chatbots, by offering consistent and neutral feedback, enable users to process emotions without fear of judgment or social risk. The 63% rate thus quantifies the chatbot’s capacity to function as a *neutral space for emotion regulation*, making it a psychologically significant tool. However, this perceived empathy is not genuine but *constructed*. As Nass and Moon (2000) argue, users tend to project human attributes onto machines, interpreting linguistic structure as emotional understanding. Yet, this illusion still serves a *therapeutic function*: it allows individuals to feel heard and validated, which is essential for emotional stability. Therefore, the 63% value reveals not technological overestimation, but an underlying human need for *predictable emotional reciprocity*. It demonstrates how students are using AI not just to learn, but to *emotionally self-regulate and cognitively reorient* transforming the chatbot into an integral part of their emotional ecosystem.

3.1 Key Insights

Taken together, the data presented in Figure 5 and Table 5 indicate that students’ engagement with chatbots during solitude is motivated by a dynamic blend of *emotional, social, and cognitive needs*. The predominance of self-expression (21%) and companionship (19.7%) confirms that chatbots are increasingly perceived as *safe emotional and communicative spaces*. At the same time, the presence of cognitive (15.5%) and regulatory (14.2%) motivations demonstrates that chatbots function as *multifunctional mediators* tools that integrate affective support, intellectual curiosity, and self-regulation within a single interactional framework. These findings substantiate the view that chatbot use reflects not mere technological interest but a complex process of psychological adaptation, aligning with Vygotskian mediation, Bandurian self-regulation, and Gross’s model of emotion management.

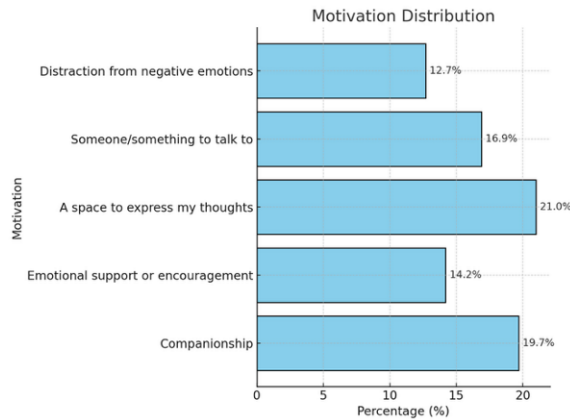


Fig. 3. Detailed breakdown of motivations for chatbot interaction (self-expression, companionship, distraction, etc.)

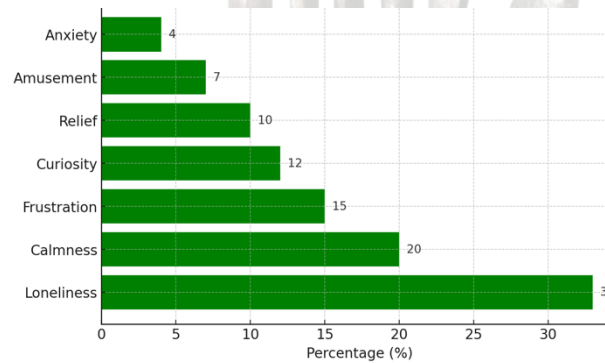
3.2 Broader Implications

The predominance of loneliness as the most frequently reported emotion during chatbot interactions suggests that these technologies are often sought as a response to social isolation. This may reflect the growing reliance on digital companions in contexts where human contact is limited or unavailable. Calmness, the second most common emotion, indicates that chatbots can provide a stabilizing and emotionally soothing presence, potentially functioning as a form of emotional self-regulation. The presence of frustration, curiosity, and relief points to the multifaceted nature of user experiences while some interactions fulfill emotional or cognitive needs, others may leave users unsatisfied or provoke mixed reactions. The relatively low reports of amusement and anxiety suggest that chatbots are less often perceived as entertainment tools or stressors, and more as supportive, conversational partners. These findings have broader implications for the design and deployment of conversational agents. Developers could optimize chatbot functionalities to enhance emotional support while minimizing user frustration, particularly for individuals experiencing loneliness. For mental health professionals and policymakers, the results underscore the potential of chatbots as supplementary tools in addressing emotional well-being, while highlighting the need to ensure that such technologies complement rather than replace human interaction.

The question 4: “What emotions do you typically feel while chatting with a chatbot?” is a closed-ended, multiple-choice question designed to capture the range of emotional responses associated with chatbot interactions. The data indicate that loneliness (33%) was the most frequently reported emotion, followed by calmness (20%) and frustration (15%). Curiosity (12%), relief (10%), amusement (7%), and anxiety (4%) were reported less frequently (Fig. 5). This format allows for clear quantification of emotional trends and facilitates comparison across different emotional categories.

Table 2. Results of the fourth question

Emotional Experience	Percentage (%)
Anxiety	4
Amusement	7
Relief	10
Curiosity	12
Frustration	15
Calmness	20
Loneliness	33

Fig. 4 Reported emotional experiences during chatbot interactions

Question 5 investigated participants' perceptions of the usefulness of ChatGPT, providing four response options: "Not at all helpful," "Not really helpful," "Sometimes helpful," and "Often helpful." The distribution of responses shows that 35% of participants considered ChatGPT sometimes helpful, while 28% reported it as often helpful. In contrast, 20% indicated that it was not at all helpful, and 17% judged it as not really helpful. This distribution highlights a diversity of user experiences and suggests that while ChatGPT is perceived as beneficial by a majority, there remains a significant portion of users who are less convinced of its utility. From a theoretical standpoint, these findings can be interpreted through the lens of the Technology Acceptance Model (TAM; Davis, 1989). According to TAM, the perceived usefulness and perceived ease of use of a technology are key determinants of its acceptance and subsequent use. The fact that a majority of participants view ChatGPT as sometimes or often helpful indicates that the tool is perceived as useful in facilitating certain cognitive tasks, such as information retrieval, problem-solving, or self-directed learning. These perceptions likely contribute to learners' intentions to continue using the system, consistent with TAM's prediction that perceived usefulness directly influences behavioral intention.

Furthermore, Social Learning Theory (Bandura, 1977) provides additional insight into these results. By interacting with ChatGPT, learners receive immediate, non-judgmental feedback, which can enhance their self-efficacy and motivation. When students perceive a tool as supportive, they are more likely to engage actively in learning tasks, explore new strategies, and develop autonomous learning skills. The positive perceptions reported by 63% of participants (sometimes or often helpful) suggest that ChatGPT may function as a cognitive and motivational scaffold, reinforcing learners' confidence in their ability to perform tasks independently.

Additionally, the mixed responses, including those indicating low perceived usefulness (37% of participants), point to potential factors that may moderate technology acceptance, such as prior experience with AI, individual learning preferences, task complexity, and contextual factors in educational settings. This aligns with findings in the broader literature on educational technology adoption, which emphasize that learner characteristics and context significantly shape perceived utility and engagement (Vekatesh et al., 2003; Teo, 2011).

The categorical presentation of responses facilitates a clear quantification of user perceptions and allows for straightforward comparison across categories (see Fig. 6 and Table 6). Beyond simple descriptive statistics, this approach provides a foundation for more complex analyses, such as examining correlations between perceived usefulness and other variables, including frequency of use, satisfaction, and learning outcomes. By

integrating these theoretical frameworks, the data suggest that ChatGPT is not only a tool for information access but also a potential mediator of learner motivation, self-efficacy, and engagement in educational settings.

3.3 Implications

Emotional Support Potential: Responses to the question about chatbots' role in emotional regulation suggest that these tools may offer meaningful support for some users. This highlights the possibility that chatbots can function as accessible aids for emotional awareness and self-management.

Variation in User Experience: However, the diversity of answers points to differing levels of effectiveness and acceptance. Some users might benefit more than others, depending on their individual needs and contexts of use.

Opportunities for Further Study: Exploring the conditions under which chatbots effectively assist emotional regulation could inform the development of more empathetic and responsive AI systems.

Question: In what ways could chatbot integration enhance emotional understanding and mental well-being across various populations?

Possible impacts include:

Facilitating Emotional Awareness: Chatbots can provide reflective dialogue that helps users recognize and articulate feelings.

1. **Offering Immediate Support:** They may deliver timely coping strategies or calming responses during emotional distress.
2. **Personalizing Emotional Assistance:** Adaptive responses could cater to individual emotional patterns and preferences.
3. **Ethical Considerations:** Reliance on chatbots for emotional support must be balanced with awareness of their limitations and the need for human intervention when necessary.

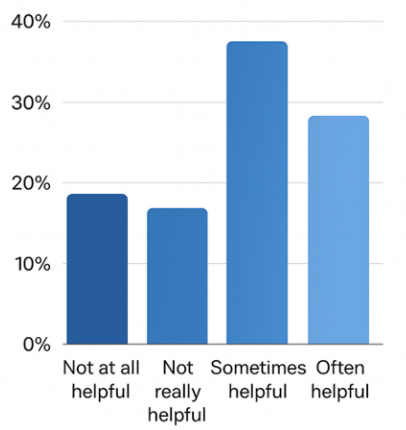


Fig. 5. Students' perceptions of ChatGPT's usefulness

4. Discussion

This study offers a comprehensive examination of Moroccan university students' emotional engagement with AI powered conversational agents, particularly in contexts

where human interaction is absent. The findings demonstrate Emotional Engagement of Moroccan University Students with Chatbots: Theoretical Insights and Implications.

This study provides a comprehensive exploration of Moroccan university students' emotional engagement with AI-powered conversational agents, particularly in contexts where direct human interaction is limited. Notably, the findings reveal a nuanced spectrum of emotional responses, ranging from curiosity, amusement, and relief to feelings of loneliness and stress alleviation. This diversity underscores the multifaceted role of chatbots, such as ChatGPT, which can act simultaneously as cognitive tools and emotional companions within academic environments.

In this context, these results can be interpreted through the lens of Self-Determination Theory (Deci & Ryan, 2000), which emphasizes the importance of autonomy, competence, and relatedness in fostering motivation and psychological well-being. Chatbots may support students' sense of autonomy by offering a private, judgment-free environment to explore emotional states and seek guidance, while enhancing competence through immediate informational and affective feedback. Similarly, Social Support Theory (Cohen & Wills, 1985) suggests that perceived availability of support here provided by chatbots can buffer stress, particularly when social networks are limited. Thus, AI-mediated interactions may act as an accessible form of emotional scaffolding.

Moreover, the data highlight variability in user experiences, suggesting that individual and contextual factors modulate the perceived effectiveness of chatbots. Consistent with Person-Environment Fit Theory (Edwards, 1991), students experiencing higher levels of academic stress or social isolation appeared more inclined to seek emotional engagement with chatbots. Consequently, AI tools may compensate for deficiencies in immediate human support, a function especially relevant in educational contexts characterized by high teacher-student ratios or limited institutional resources. In the Moroccan context, where digital infrastructure, AI literacy, and cultural norms regarding emotional expression vary widely, this compensatory role becomes particularly meaningful.

However, the findings also illuminate potential limitations and ethical considerations. While many students reported comfort and reduced anxiety, others expressed skepticism regarding the depth, authenticity, and reliability of emotional support offered by AI. This aligns with ongoing debates in human-computer interaction literature regarding anthropomorphism, emotional authenticity, and ethical design of affective AI systems (Picard, 1997; Shneiderman, 2020). Therefore, concerns about over-reliance on AI, substitution of human relationships, and data privacy highlight the need for interventions that clearly delineate between programmed responses and genuine human empathy.

From a pedagogical perspective, integrating emotionally responsive AI into higher education could yield both motivational and cognitive benefits. Students may leverage chatbots as tools to articulate feelings, reflect on emotional states, and develop self-regulation strategies, potentially enhancing persistence, engagement, and academic performance. In addition, Cognitive Load Theory (Sweller, 1988) suggests that chatbots can reduce extraneous cognitive load during emotionally taxing situations, allowing students to focus on learning tasks while receiving supportive feedback. Importantly, this integration should be complementary rather than substitutive, emphasizing human mentorship, peer collaboration, and culturally sensitive approaches that respect local norms of emotional expression.

Nonetheless, the study's limitations must be acknowledged. Reliance on self-reported emotional experiences introduces subjectivity, and the cross-sectional design restricts causal inference. Therefore, future research should employ mixed-methods and longitudinal designs, including biometric or psychophysiological measures, to capture the sustained effects of AI-mediated engagement. Expanding the participant pool to include diverse academic disciplines, socioeconomic backgrounds, and cross-cultural contexts would further enhance the generalizability and applicability of findings.

In conclusion, the study underscores the potential for chatbots to serve as valuable tools in higher education settings, providing an additional layer of emotional support that can contribute to students' well-being and academic success. However, the integration of such AI technologies must be carefully managed to balance technological advantages with ethical considerations, ensuring that students are aware of the scope and limits of chatbot assistance and explore moroccan university students' interactions with chatbots reflect a complex interplay between technological opportunity, cultural specificity, and individual emotional needs. While AI conversational agents offer measurable emotional benefits, their effective adoption in educational and social settings requires careful attention to ethical standards, cultural sensitivity, and technological transparency. Ultimately, this study contributes to the broader literature on emotional AI in education, emphasizing the importance of contextualizing global AI trends within local realities and advocating for theoretically informed, ethically grounded, and culturally responsive integration of AI tools in higher education.

4.1 Cultural Specificity in Emotional Engagement

Importantly, the Moroccan context introduces distinct cultural dimensions that shape students' interactions with AI chatbots. While previous discussions emphasized the compensatory role of AI in contexts of limited human support, it is equally critical to examine how cultural norms mediate emotional expression and acceptance of AI-mediated interactions. Specific cultural factors such as collectivism, which emphasizes group harmony over individual disclosure; communication taboos, which discourage open discussion of certain emotions; and gender norms, which influence the socially acceptable ways men and women express feelings—can significantly affect students' willingness to engage emotionally with chatbots.

For example, communication taboos often make it difficult for students to openly discuss mental health issues such as depression, anxiety, stress related to academic performance, or personal family problems. Collectivist values may further discourage personal disclosure in order to maintain social harmony, while gender norms may shape different expectations for how men and women express vulnerability or seek emotional support. Consequently, these cultural variables can influence the depth and type of emotional engagement students are comfortable having with chatbots. Some students may find AI interactions helpful and safe for emotional expression, whereas others may remain hesitant or skeptical.

However, chatbots can provide a safe, non-judgmental, and accessible environment that helps students overcome these cultural taboos. By allowing students to articulate emotions anonymously and receive supportive feedback, AI tools can facilitate emotional expression in ways that might be challenging in traditional social contexts. Therefore, understanding these cultural factors is not only important for system design but also highlights how chatbots can effectively mediate emotional support, helping students navigate sensitive topics while respecting social norms.

Finally, our results indicate that certain behaviors reflect Moroccan cultural specificities, particularly regarding modesty and self-control. While our findings suggest certain cultural patterns, these observations are specific to our sample and should not be overgeneralized to the entire Moroccan population. Nevertheless, these trends highlight interesting avenues for future exploratory research.

Conclusion

This study explored the emotional engagement of Moroccan students with chatbots, highlighting clear trends such as self-expression, the sense of companionship, and emotional regulation. The results indicate that frequent use of these conversational agents can provide occasional emotional support and facilitate certain social interactions, particularly in contexts where access to human assistance is limited. However, these findings should be interpreted with caution. Chatbots do not replace human interactions and cannot provide comprehensive or long-term emotional support. The methodological limitations of the study, such as voluntary sampling and the absence of confirmatory statistical analyses, constrain the generalizability of the conclusions. Moreover, the initial optimism regarding the role of chatbots should be tempered by ethical considerations, including data privacy, potential dependency, and the risk of misinformation. Thus, while chatbots represent a promising complementary tool for emotional support and personal expression, their use should be framed within a responsible and supervised approach, serving as a supplement rather than a substitute for human interaction. Future research incorporating more robust quantitative analyses and longitudinal follow-up is necessary to better assess their actual impact on users' well-being.

In exploring the emotional engagement of students with AI chatbots, several limitations must be acknowledged. Firstly, the research was conducted within a single Moroccan university, which may limit the generalizability of the findings across different educational institutions, regions, or cultural contexts. Emotional expression and attitudes toward AI are deeply influenced by cultural norms, and thus results may vary in other settings. Secondly, it is important to acknowledge that the use of self-reported measures introduces certain limitations on the robustness of conclusions, particularly concerning emotional regulation and Objective 3. While self-reports provide valuable insight into students' perceptions and subjective experiences with chatbot-mediated emotional support, they inherently reflect individual interpretation, memory bias, and social desirability effects. Consequently, these measures may not fully capture all dimensions of emotional regulation or the nuanced mechanisms through which chatbots influence affective processes. To address this, we have emphasized that our findings regarding emotional regulation should be interpreted with caution. Specifically, while the data suggest that students perceive chatbots as helpful for articulating emotions, reducing stress, and reflecting on their emotional states, these conclusions are constrained by the subjective nature of the measures. Therefore, the study highlights trends and perceptions rather than definitive behavioral or physiological outcomes.

Furthermore, this limitation underscores the need for future research to adopt mixed-methods approaches, including longitudinal designs, objective behavioral indicators, and biometric measures (e.g., heart rate variability, galvanic skin response, or facial expression analysis) to obtain a more comprehensive understanding of how AI-mediated interactions affect emotional regulation over time. By integrating these methods, researchers could validate self-reported perceptions and more accurately assess the sustained effects of chatbot interactions on students' emotional well-being. Thirdly, the quantitative design, while enabling broad data collection and statistical analysis, limits the

depth of insight into individual user experiences. Qualitative methods, such as interviews or focus groups, could complement this approach by revealing richer, more nuanced understandings of how students relate emotionally to chatbots and the contexts in which they find them most useful or challenging. Fourthly, the study focused exclusively on chatbots designed for emotional engagement, excluding other AI systems that may have different capacities, such as AI-driven tutoring platforms or more advanced affective computing technologies. This narrower scope may restrict the applicability of conclusions to the broader AI landscape in educational contexts. Fifthly, the sample consisted predominantly of female students, which may introduce a gender-related bias in the findings. Previous research indicates that emotional expression, coping strategies, and attitudes toward AI can differ across genders. Consequently, the predominance of female participants could have influenced the observed patterns of emotional engagement, limiting the representativeness of the results for the broader student population. Future studies should aim for more balanced gender representation to ensure findings are not disproportionately shaped by one gender group. Finally, the rapid evolution of AI technology means that our findings reflect a snapshot in time. As chatbot capabilities improve and users become more familiar with AI interactions, patterns of emotional engagement and perceptions are likely to evolve, highlighting the need for ongoing research to monitor these dynamics. Although the present analysis primarily relies on descriptive statistics, exploratory correlation analyses between chatbot usage frequency and emotional variables are planned for future research to quantitatively validate these patterns.

In conclusion, although self-reported data provide meaningful insights into perceived emotional support, and the study offers a valuable contribution to understanding AI-mediated emotional engagement in Moroccan higher education, these methodological and contextual limitations including the single-institution sample, reliance on subjective measures, quantitative design constraints, and gender imbalance constrain the generalizability and causal interpretation of the findings. Recognizing these constraints strengthens the transparency and rigor of the study while providing clear directions for future investigation

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