CHATBOTS AND CRISIS COMMUNICATION: EFFECTIVENESS AND LIMITATIONS IN THE EDUCATIONAL SECTOR

CHATBOTS E COMUNICAÇÃO DE CRISE: EFICÁCIA E LIMITAÇÕES NO SETOR EDUCACIONAL

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Abstract. Chatbots play an increasingly significant role in crisis communication by providing real-time information and reducing misinformation. This article explores their application in the educational sector, focusing on their effectiveness during crises. The COVID-19 crisis underscored the urgency of robust communication solutions to ensure accurate and timely sharing of information. The educational sector, serving large and diverse populations, faces unique challenges during emergencies. These challenges include the need to quickly and reliably convey information to a wide range of individuals, including students, parents, teachers, and administrative staff. By integrating chatbots, these institutions can enhance user satisfaction by providing immediate and relevant responses while maintaining educational continuity despite disruptions. However, technological and social limitations persist. Challenges such as the accuracy of AI- provided responses, the linguistic and cultural adaptability of chatbots, and user trust need to be addressed. This research proposes solutions to overcome these obstacles by examining various use cases and drawing on empirical study. The findings demonstrate that, while chatbots cannot fully replace human communicators, they are valuable tools for enhancing communication strategies and supporting educational communities during crises. Their ability to deliver real-time updates, reduce misinformation, and offer emotional support makes them indispensable for crisis communication in the educational sector. With proper implementation and continuous improvement, chatbots can play a pivotal role in crisis management, ensuring that educational processes remain uninterrupted, and stakeholders receive reliable information and consistent support. This study emphasizes the need for ongoing innovation and research to optimize chatbot technology for crisis communication, making the educational sector more resilient and adaptable to emergency situations.

Keywords: Chatbots; Crisis communication; COVID 19; Education

Resumo. Os chatbots desempenham um papel cada vez mais significativo na comunicação de crises, ao fornecer informações em tempo real e reduzir a desinformação. Este artigo explora sua aplicação no setor educacional, com foco em sua eficácia durante crises. A crise da COVID-19 ressaltou a urgência de soluções de comunicação robustas para garantir o compartilhamento preciso e oportuno de informações. O setor educacional, que atende a populações grandes e diversas, enfrenta desafios únicos durante emergências. Esses desafios incluem a necessidade de transmitir informações de forma rápida e confiável para uma ampla gama de indivíduos, incluindo estudantes, pais, professores e funcionários administrativos. Ao integrar chatbots, essas instituições podem melhorar a satisfação do usuário ao fornecer respostas imediatas e relevantes, mantendo a continuidade educacional, apesar das interrupções. No entanto, persistem limitações tecnológicas e sociais. Desafios como a precisão das respostas fornecidas por IA, a adaptabilidade linguística e cultural dos chatbots e a confiança dos usuários precisam ser abordados. Esta pesquisa propõe soluções para superar esses obstáculos, examinando vários casos de uso e baseando-se em estudos empíricos. Os resultados demonstram que, embora os chatbots não possam substituir completamente os comunicadores humanos, eles são ferramentas valiosas para aprimorar as estratégias de comunicação e apoiar as comunidades educacionais durante crises. Sua capacidade de fornecer atualizações em tempo real, reduzir a desinformação e oferecer apoio emocional os torna indispensáveis para a comunicação de crises no setor educacional. Com a implementação adequada e melhorias contínuas, os chatbots podem desempenhar um papel crucial na gestão de crises, garantindo que os processos educacionais permaneçam ininterruptos e que os stakeholders recebam informações confiáveis e apoio constante. Este estudo enfatiza a

necessidade de inovação e pesquisa contínuas para otimizar a tecnologia de chatbots para a comunicação de crises, tornando o setor educacional mais resiliente e adaptável a situações de emergência.

Palavras-chave: Chatbots; Comunicação de crises; COVID-19; Educação

1. INTRODUCTION

In the digital age, artificial intelligence (AI) and machine learning have revolutionized communication strategies, particularly in crisis communication within the education sector. Crisis communication refers to the strategic exchange of information designed to address urgent situations that threaten the stability or safety of an organization and its stakeholders. It aims to provide timely, accurate, and relevant information to minimize uncertainty, maintain trust, and ensure continuity during disruptions (Maniou & Veglis, 2020).

Crises, such as pandemics, natural disasters, cyberattacks, and social conflicts, create urgent demands for effective and timely communication. In the education sector, these disruptions can threaten operations, increase anxiety among stakeholders, and slow down the delivery of essential services. Traditional communication methods often fail to meet these demands due to their limited capacity to handle high volumes of inquiries and their inability to adapt to rapidly evolving situations. Chatbots, as AI-driven conversational agents, have emerged as powerful tools in crisis communication by automating interactions, delivering real-time updates, and mitigating misinformation. This positions them as critical assets in addressing the communication challenges that crises pose in educational contexts (Majumder & Mondal, 2021; Frommert & al., 2018).

The COVID-19 pandemic provided a clear demonstration of the potential of chatbots in crisis communication, particularly in addressing the surge in information needs during a global emergency. Educational institutions faced unprecedented challenges, requiring rapid and effective communication with students, parents, staff, and other stakeholders. During this period, chatbots centralized information, provided real-time updates, and reduced pressure on overwhelmed traditional communication channels, such as phone lines and email systems (Miner et al., 2020). Beyond health crises, educational institutions face other disruptions, including natural disasters, cyberattacks, and economic or social crises, all of which demand resilient communication strategies. By automating responses and delivering 24/7 support, chatbots have demonstrated their ability to bridge communication gaps during critical periods, ensuring that stakeholders remain informed and engaged (Balderas et al., 2023; Bresnick, 2021). Patricia Velazquez, director of education and research industry strategy at Oracle, emphasized that the "COVID-19 pandemic highlighted the need for digital assistants", particularly when traditional communication channels were overwhelmed and users were unsure where to find accurate information (Erin Brereton, 2021). This illustrates the critical role chatbots can play in enhancing resilience and ensuring continuity during crises.

One prominent example of chatbot adoption is OpenAI's ChatGPT, a conversational agent that has seen exponential growth in user engagement since its release in November 2022. As illustrated in Figure 1, ChatGPT experienced a rapid increase in usage, with monthly visits surpassing 1 billion by February 2023 (Exploding Topics, 2024). Despite a notable decline in mid-2024, this trend underscores the sustained interest in conversational agents, reflecting their potential in enhancing communication during crises. Such widespread usage demonstrates the growing trust in AI-powered tools and highlights their role as an integral part of modern digital communication landscapes. For educational institutions, this translates into opportunities to leverage chatbots like ChatGPT to develop more efficient and timely crisis communication strategies, ensuring that they meet the dynamic needs of their stakeholders (Similarweb, 2024; Georgescu, 2018).

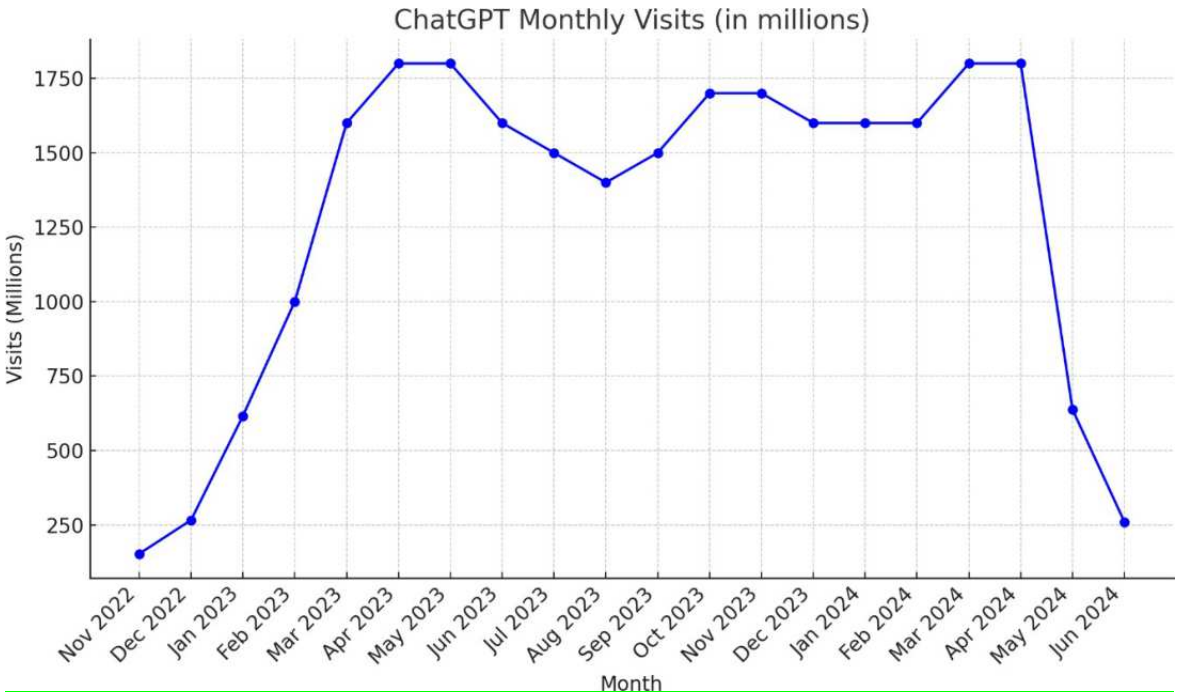


Figure 1. CHATGBT Monthly Visits (in millions)

This practical example underscores the importance of grounding such advancements within established theoretical frameworks. Crisis management theory highlights the need for swift, strategic, and centralized communication to mitigate the adverse effects of crises on stakeholders (Maniou & Veglis, 2020). Chatbots fulfill this requirement by providing rapid and reliable responses, enabling educational institutions to respond effectively to urgent needs. Similarly, the theory of technological innovation underscores how emerging tools like chatbots can transform traditional communication paradigms. By automating routine interactions and improving the efficiency and reach of communications, chatbots represent a significant advancement in crisis management practices within education (Georgescu, 2018; Yin, 2018).

While chatbots offer significant advantages, their limitations must also be considered. They often struggle with handling complex or emotionally charged queries, exhibit limited adaptability to multicultural contexts, and rely heavily on robust technological infrastructure (Bresnick, 2021). Addressing these challenges is crucial for optimizing the design and deployment of chatbots in educational settings.

The main objective of this study is to investigate the effectiveness of chatbots in crisis communication for educational institutions. This involves assessing their ability to deliver accurate, real-time information, mitigate misinformation, and support educational continuity during disruptions. The study also aims to identify and address the technological and social limitations that may limit the optimal use of chatbots in this context.

This research is essential for educational institutions seeking to improve their crisis communication strategies. By leveraging chatbots, these institutions can provide immediate and relevant responses to inquiries, thereby enhancing user satisfaction and ensuring continuous educational processes even in times of crisis.

2. METHODOLOGY

In examining the role of chatbots in crisis communication within educational institutions, the qualitative method proved to be the most effective approach for this study. This method allows for a rich, detailed understanding of the implementation and impact of chatbots by focusing on specific instances and practical experiences. By analyzing multiple case studies,

the research can capture diverse perspectives, highlight common themes, and uncover unique challenges and successes.

2.1.Justification for Qualitative Case Study Approach

A qualitative case study approach was chosen for its ability to provide in-depth insights into complex phenomena within real-life contexts. This method is particularly well-suited for exploring the nuanced dynamics of chatbot implementation in educational crisis communication. By examining multiple case studies, the research can capture a diverse range of experiences, highlight common themes, and uncover unique challenges and successes associated with the use of chatbots in different educational settings (Yin, Robert K., 2018).

2.2.Selection of Case Studies

The study focuses on five universities, each selected for their exemplary use of AI-driven chatbots and the availability of comprehensive documentation on their implementation and outcomes. These institutions were chosen based on their innovative approaches, diversity in educational contexts, and relevance to the research objectives:

1. California State University, Northridge (CSUN): CSUN utilized chatbots to manage communication during the COVID-19 pandemic. The chatbots were deployed to disseminate information about the pandemic, survey students on their preferences for fall classes, and support the transition to remote learning. (Erin Brereton, 2021)
2. George Washington University (GWU): GWU's proactive use of chatbots during the COVID-19 pandemic to support students, staff, and faculty highlights the critical role of these tools in crisis management. The university's comprehensive approach to maintaining operational continuity and supporting the well-being of its community offers a rich case for analysis (George Washington University., 2019).
3. Texas A&M University: Texas A&M leveraged AI chatbots to engage students and provide real-time support during COVID-19 restrictions. The chatbots were used across various departments, including financial aid, registrar, and student success offices. They helped answer questions about health protocols, campus services, and other COVID- 19-related issues, ensuring that students received timely and accurate information. This initiative demonstrated the effectiveness of chatbots in managing large volumes of inquiries and maintaining continuous communication during a crisis (UB Custom Publishing, 2020).
4. Arizona State University (ASU): ASU's extensive adoption of AI-enabled chatbots during the COVID-19 pandemic helped in managing communication and providing timely information to students and staff. The chatbots were used to deliver updates on health guidelines, campus closures, and remote learning resources, thus ensuring continuous support and accurate information dissemination during the crisis. This case study highlights the versatility and effectiveness of chatbots in handling a public health emergency and maintaining communication efficiency (Peggy Bresnick, 2021).
5. Georgia State University (GSU): Although not a crisis, GSU's use of personalized text messaging and chatbots to reduce summer melt and improve student retention rates demonstrates the potential of AI in addressing significant educational challenges. The university's data-driven initiatives provide compelling evidence of the effectiveness of chatbots in enhancing student success and engagement (Georgia State University, n.d)

2.3.Data Collection

The data for this study were collected through comprehensive document analysis. This involved reviewing a wide range of materials, including university reports, case studies,

academic articles, and other publicly available documentation related to the implementation and use of chatbots at each selected institution. This method allowed for an in- depth understanding of each case without the need for direct interviews or observations. To ensure the reliability and validity of the documents analyzed, a systematic approach was adopted, including triangulation of data sources. Moreover, thematic analysis was conducted, and the inclusion of testimonials from key stakeholders enriched the study by providing direct insights into the practical impacts and perceived effectiveness of the chatbot implementations.

2.4.Sample

The study sample includes detailed case studies from five American universities, selected for their exemplary use of chatbots in crisis communication. These universities were chosen based on key criteria, including diversity in size and type, ranging from medium-sized institutions like George Washington University (approximately 25,900 students) to very large ones like Arizona State University (approximately 140,000 students). Each case study provides rich insights into the successes and challenges of chatbot implementation, particularly during the COVID-19 pandemic, demonstrating how AI technologies were applied to address significant educational challenges in various contexts.

Table 1. Names of Universities, Their Locations, and Estimated Student Enrollments

Name of the University	Location	Number of Students
California State University, Northridge	Northridge, California	Approximately 37,500
George Washington University	Washington, D.C.	Approximately 25,900
Texas A&M University	College Station, Texas	Approximately 74,800
Arizona State University	Tempe, Arizona	Approximately 140,000
Georgia State University	Atlanta, Georgia	Approximately 36,000

Note: The data presented in this table is based on student population and enrollment statistics from various universities as detailed in the following references: Terrill (2023) for Arizona State University, UnivStats (2024) for California State University-Northridge and Texas A & M University-College Station, and College Evaluator (2024) for Georgia State University and George Washington University.

2.5.Data Analysis

Thematic analysis was employed to analyze the collected data. This method involved systematically coding the data to identify key themes, patterns, and insights across the case studies.

3. RESULTS

The results of this study highlight the significant impact of chatbots on crisis communication within educational institutions. Through the implementation of chatbots, universities have improved communication efficiency, student engagement, operational continuity, crisis management, and addressed specific educational challenges. The following sections provide adetailed analysis of the quantitative and qualitative benefits observed across various universities.

The universities included in this analysis are:

- **California State University, Northridge (CSUN)**
- **George Washington University (GWU)**
- **Texas A&M University**
- **Arizona State University (ASU)**
- **Georgia State University (GSU)**

3.1.Analysis Table

The table below provides a summary of the results achieved by the selected universities through the use of chatbots in crisis management. It highlights the specific usage, advantages, challenges encountered, and observed outcomes at each institution.

Table 2. Case Study of University Chatbot Implementations: Usage, Advantages, Challenges, and Results

University	Chatbot Usage	Advantages	Challenges	Results
California State University, Northridge (CSUN)	Information about the pandemic, conduct surveys on upcoming courses, support for distance learning	Panic reduction, high engagement (30%)	Issues with maintaining consistent engagement over time, technical support needed for continuous updates	Improved communication, continuous support for distance learning
George Washington University (GWU)	Support for students, staff, and faculty through digital tools, including the "Martha" chatbot	Operational continuity, community well-being, digital tools, including the "Martha" chatbot, helped handle 1,842 troubleshooting requests, manage 879 service requests, and access 13,700 knowledge articles	Initial technical issues with integration, need for training and familiarization among users	Increased support, accurate and real-time information Through a combined digital strategy
Texas A&M University	Real-time support for health protocols and campus services	Quick access to information, handled over 14,300 chatbot conversations before COVID-19, managing large volumes of requests	Technical Challenges in Scaling the system, ensuring reliable performance during peak times	Continuous communication, student Satisfaction
Arizona State University (ASU)	Information on health guidelines, campus closures, remote learning resources	Time-saving, reduced staff burden, 85% of students expressed high satisfaction	Difficulty in providing nuanced responses, need for continuous updates to keep information relevant	Dissemination of accurate and timely information, continuous support

3.2.Thematic Analysis

Communication Efficiency

CSUN, GWU, Texas A&M, ASU: Chatbots significantly improved communication efficiency by providing real-time responses to queries, crucial during the COVID-19 pandemic. They managed high volumes of information requests related to health guidelines, campus operations, and remote learning resources, ensuring students and staff received accurate and timely information.

> *"It really allowed us to be in touch with tens of thousands of students in a way I don't think we would have been able to without the bot."* — Elizabeth Adams, Associate Vice President of Undergraduate Studies, CSUN (Erin Brereton, 2021)

Student Engagement

CSUN, GSU: Chatbots facilitated active student participation. CSUN achieved a 30% engagement rate by surveying students on fall class preferences and supporting remote learning. GSU used chatbots to address summer melt, showing significant improvements in student retention rates through personalized messages and engagement strategies. The chatbot "Pounce" answered over 200,000 questions in one summer, reducing summer melt by 21.4%. Additionally, 94% of students who used Pounce chatbot recommended its continued use for future classes.

> *"Implementing the chatbot led to significant improvements: our summer melt rate decreased from 18% to 14%, enrollment increased by 3.9%, and the FAFSA verification process completion rate improved by 16%." — Scott Burke, Associate Vice President and Director of Undergraduate Admissions, GSU (Mainstay, 2017)*

Support for Operational Continuity

GWU, Texas A&M: Chatbots supported operational continuity during the pandemic by managing inquiries related to financial aid, registration, and academic support, ensuring students received necessary assistance without delays. GWU used various digital tools, including the chatbot "Martha," which contributed to the overall success by providing real-time information and handling thousands of requests as part of a combined digital strategy. This strategy helped manage 1,842 troubleshooting requests, 879 service requests, and facilitated access to 13,700 knowledge articles.

> *"We launched 'Live Chat' during COVID-19. It provided another avenue of support for students, who could go onto the website and have immediate interactions. Students who used this feature found it very helpful." — Samantha Wilson, Executive Director - Texas A&M University (UB Custom Publishing, 2020)*

Crisis Management and Information Dissemination

CSUN, GWU: Chatbots played a crucial role in crisis management and information dissemination during the COVID-19 pandemic, not only supporting students but also assisting staff. They provided up-to-date information on health guidelines, campus closures, and available support services, ensuring that both students and staff were well- informed and could promptly access the necessary resources. By doing so, chatbots helped maintain operational continuity and reduced the burden on staff by automating the dissemination of critical information.

> *"It's been a real lifesaver in that sense." — Elizabeth Adams, Associate Vice President of Undergraduate Studies, CSUN (Erin Brereton, 2021)*

Addressing Educational Challenges:

GSU: Although not a crisis, GSU's use of chatbots to reduce summer melt demonstrated the versatility of chatbots in addressing significant educational challenges. Personalized messages and chatbot interventions kept students engaged and informed, leading to better retention outcomes.

> *"If you were just thinking about this as a texting option, it is much more than that. It is the opportunity for you to be more personalized, to be more conversational with students in an area where you didn't think that could happen. I was skeptical about that, but the results prove themselves." — Scott Burke, Associate Vice President and Director of Undergraduate Admissions, GSU (Mainstay, 2017)*

The analysis of the results indicates that chatbots have played a pivotal role in enhancing communication efficiency, increasing student engagement, supporting operational continuity, managing crises, and addressing educational challenges in the educational sector. These findings underscore the value of chatbots as an essential tool for crisis communication and support within universities. The subsequent discussion will delve deeper into these results, exploring their implications and potential areas for future research.

4. DISCUSSION

The results of this research confirm the crucial importance of chatbots in crisis communication within educational institutions. The analyzed case studies demonstrate that chatbots have played a central role in the rapid and accurate dissemination of essential information, particularly during the COVID-19 pandemic.

4.1.Interpretation of Results

The case studies revealed that chatbots effectively responded to a large number of crisis-relatedinquiries, providing precise and real-time answers. This ability to manage a high volume of requests while maintaining a high level of accuracy helped reduce confusion and anxiety among students and staff, thus ensuring continuity in institutional communication during critical periods.

4.2.Essential Role of Chatbots

This research highlights the evolution of institutional practices in response to crises, where chatbots have emerged as indispensable tools. The results show that chatbots not only managed communications efficiently but also helped maintain student engagement by ensuring continuous access to educational resources. The analysis of case studies suggests that in an increasingly digitalized environment, institutions that integrate chatbots into their crisis management strategies are better prepared to handle disruptions and minimize their impact on the educational community.

4.3.Contribution and Practical Implications

By relying on concrete case studies, this study substantiates how chatbots serve as essential instruments for effective information dissemination and sustaining student engagement during critical times. The findings underscore the importance for educational institutions to incorporate

chatbots into their crisis management frameworks. These tools, through automated and personalized responses, alleviate the burden on traditional communication channels while providing continuous support to students and staff. Proper configuration and regular updates of chatbots can decisively contribute to maintaining institutional stability during prolonged crises. Consequently, this research underscores the vital role of chatbots in educational institutions during crises, demonstrating their importance in maintaining effective communication and supporting the educational community in times of need.

4.4.Limitations and Future Research

While this study provides valuable insights into the use of chatbots in crisis communication, it has certain limitations. The research focused on a limited number of American universities, which may restrict the generalizability of the findings to other cultural and educational contexts.Additionally, the lack of a detailed quantitative assessment of chatbots impact on students academic performance during the crisis leaves an area that requires further exploration. Futureresearch could examine the effectiveness of chatbots in other regions and provide a more detailed analysis of their long-term impact on educational success. It would also be pertinent to explore how chatbots can be improved to offer more nuanced and tailored responses to individual user needs, particularly through advanced AI approaches.

5. STRATEGIC RECOMMENDATIONS FOR OPTIMIZING CHATBOT USE IN CRISIS COMMUNICATION

Based on the analysis of the challenges and limitations highlighted in this study, it is evident that while chatbots play a crucial role in enhancing crisis communication within the educationalsector, there are several areas that require further attention and improvement. To fully capitalizeon the potential of chatbots in managing crises, it is essential to address the identified shortcomings and optimize their application in various contexts. The following recommendations aim to provide actionable insights and strategies to enhance the effectiveness, adaptability, and trustworthiness of chatbots in educational crisis communication.

1. **Enhancing Linguistic and Cultural Responsiveness:** Chatbots need to be continuously trained and adjusted to adequately address the diverse linguistic and cultural needs of users in the educational context. This includes not only understanding different languages but also cultural nuances to ensure that crisis messages are well understood and accepted by all user groups.
2. **Building User Trust:** To overcome initial user skepticism toward chatbots, it is essential to develop features that enhance transparency and effectiveness. For example, providing more personalized responses, offering the option to switch to human interaction when necessary, and clearly explaining the sources of the information provided by the chatbot can help build this trust.
3. **Continuous Data Updates:** Chatbots used in crisis communication must be continuously updated with the latest information. This is especially important in dynamic situations like a pandemic, where guidelines and information can change rapidly. Integrating automated data update systems could ensure that chatbots always provide accurate and up-to-date information.
4. **Continuous Performance Evaluation and Improvement:** It is crucial to establish a regular process for evaluating the performance of chatbots after each crisis to identify weaknesses and propose improvements. Analyzing user feedback and

evaluating performance metrics (response rates, user satisfaction, etc.) should be systematic to guide the evolution of chatbots in an educational context.

6. CONCLUSION

The study presented in this article clearly demonstrates the growing importance of chatbots in crisis communication within the educational sector. The findings highlight their ability to provide accurate and real-time information while reducing misinformation and ensuring the continuity of educational processes during crises. Although chatbots cannot entirely replace human communicators, they prove to be indispensable tools for strengthening communication strategies and supporting educational communities.

However, it is crucial to recognize the ongoing technological and social challenges, such as linguistic and cultural adaptability and user trust. These aspects require continuous attention tooptimize the effectiveness of chatbots and maximize their adoption in various educational contexts.

Ultimately, this research underscores not only the effectiveness of chatbots as crisis management tools but also calls for continuous innovation to improve these technologies. The final objective is to make educational institutions more resilient and capable of proactively responding to future emergencies. Future research should therefore focus on exploring more personalized and advanced solutions to further enhance the effectiveness and reach of chatbots in crisis communication.

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