



# Transforming Communication Through Virtual Assistants using Generative Artificial Intelligence

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ARTICLE INFO	ABSTRACT
<b>Published Online:</b> <b>30 October 2025</b>	Educational institutions worldwide face persistent administrative challenges, especially regarding communication, information dissemination, and response times. This research introduces WolfChat, an informational chatbot designed for the General Directorate of Industrial and Service Technological Education (DGETI) in Hidalgo, Mexico. WolfChat integrates JavaScript, Google Generative AI, and On the other hand, the WhatsApp application is used as an interface to automate the flow of academic and administrative information. The study follows an applied, experimental, and quantitative methodology to measure the impact of chatbot implementation on administrative efficiency. Preliminary results show that WolfChat improves response efficiency by 65.8%, reduces repetitive administrative tasks by 60%, and enhances user satisfaction. This paper also discusses the theoretical framework behind AI-based chatbots, their potential scalability to other educational systems, and their contribution to digital transformation aligned with global sustainability goals and
<b>Corresponding Author:</b> <b>Oscar Lira Uribe</b>	the National Development Plan of the current government, which promotes the use of technological infrastructure, close the technological gap in different sectors.
<b>KEYWORDS:</b> Chatbot, Generative AI, DGETI, Education, Automation, Digital Transformation	

## I. INTRODUCTION

In the digital era, educational institutions face significant challenges in managing administrative processes and communication flow. The General Directorate of Industrial and Service Technological Education (DGETI) oversees more than 629,000 students in 456 schools across Mexico. Despite technological advances, administrative inefficiencies persist, especially in handling repetitive inquiries about enrollment, certificates, social service, and exam procedures. This situation generates delays, workload saturation, and reduced satisfaction among both students and staff. WolfChat emerges as a technological response, integrating artificial intelligence and instant messaging to provide fast, accurate, and context-aware information. Its implementation aligns with Mexico's national digital policies and the United Nations Sustainable Development Goal 9, promoting innovation, infrastructure, and digital inclusion.

## II. THEORETICAL FRAMEWORK

Su et al. (2025) realizó una investigación tipo ensayo aleatorizado para la educación de pacientes para pruebas prenatales de aneuploidía, con el objetivo de determinar el impacto de uso de un chatbot como asistente educativo y de asesoramiento. El método utilizado se divide en dos partes,

en la primera los pacientes utilizaron el chatbot antes de la visita al proveedor mientras que la segunda solo recibió educación del proveedor.

Los resultados obtenidos muestran que la adquisición de conocimientos fue más alta entre las pacientes que usaron el chatbot contra las que no lo usaron, así mismo los proveedores también informaron de resultados más altos en función de respuestas correctas, cabe mencionar que para el estudio se trabajó con 258 mujeres.

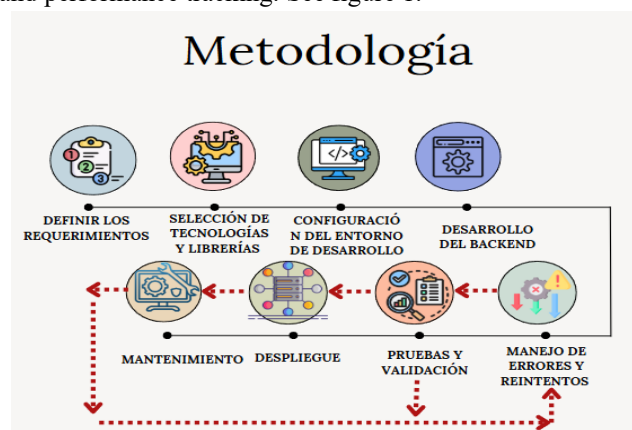
Martínez Rolán (2024) analyzed the implementation of an educational chatbot as a support tool in teaching in the Advertising and Public Relations degree at the University of Vigo, Spain. The objective of the work carried out was to evaluate how chatbots can improve access to academic information and streamline exam preparation through faster interaction with students. First, the chatbot was developed on the Chatbase.co platform, programmed to respond exclusively about the contents of the subject "Alternative Communication".

The integration of artificial intelligence in educational environments has gained momentum due to its capacity to enhance communication and operational efficiency. According to Martinengo et al. (2023), conversational agents are transforming healthcare and education by simulating

human-like interactions that enable continuous information access. Similarly, Blandón León and Mojica Baltodano (2023) demonstrated the potential of ChatGPT-based chatbots to optimize administrative management, reducing task times and improving organizational coordination. Chiu et al. (2023) found that AI-driven chatbots support student motivation when properly integrated with teaching methodologies, highlighting the relevance of user experience and feedback. WolfChat builds upon these foundations by integrating the capabilities of Google Generative AI within WhatsApp, a widely adopted communication platform in Mexico, ensuring accessibility and usability for all educational stakeholders.

### III. METHODOLOGY AND SYSTEM DEVELOPMENT

This research follows an applied and experimental methodology with a quantitative approach. The development of WolfChat was divided into eight stages: 1) Defining functional requirements; 2) Selecting technologies and libraries; 3) Setting up the development environment; 4) Developing the backend; 5) Managing errors and retries; 6) Conducting unit and integration tests; 7) Deployment; and 8) Maintenance. The chatbot uses Node.js as the backend framework, integrating Venom-Bot for WhatsApp API interaction and Google Generative AI for natural language processing. It processes diverse file types (Excel, CSV, DOCX, PDF, images) to extract information and generate contextually accurate responses. For deployment, WolfChat was hosted on Railway Cloud to ensure reliability and scalability, with monitoring systems implemented for uptime and performance tracking. See figure 1.



**Figure 1. Methodology for the development and implementation of the WolfChat Source: Own elaboration**

### IV. SYSTEM ARCHITECTURE AND FUNCTIONALITY

WolfChat operates under a modular architecture designed for efficiency and adaptability. The backend handles data parsing, session management, and API requests to Google Generative AI. The frontend interface, powered by WhatsApp, allows users to send inquiries in natural language.

WolfChat then interprets user intent using AI-based natural language processing, searches the relevant datasets, and provides precise responses. The chatbot stores conversation histories for continuous improvement and uses hash verification to prevent data duplication. This design ensures 24/7 operation and adaptability to other administrative systems.

### V. RESULTS AND DISCUSSION

WolfChat was tested in four DGETI campuses in Hidalgo: CBTIS 287, 59, 218, and 8. During pilot testing, the chatbot managed to assist 35 students per hour, outperforming traditional administrative processes by 65.8%. User feedback collected through satisfaction surveys showed that 80% of respondents rated efficiency at level 5, 90% confirmed that the information provided was updated, and 92% expressed willingness to continue using WolfChat.

Qualitative feedback emphasized the usefulness of 24/7 availability and the reduction of waiting times for administrative tasks. In addition, staff reported decreased workload and increased productivity, allowing more time for strategic planning and student engagement. Comparatively, similar implementations in Latin American institutions have shown efficiency gains between 40% and 60%, confirming that WolfChat's results are above average for AI-based administrative tools.

### VI. IMPACT AND FEASIBILITY ANALYSIS

WolfChat demonstrates not only technical feasibility but also social, economic, and environmental impact. Technically, its design based on JavaScript and Google Generative AI ensures flexibility and scalability. Economically, the solution requires minimal hardware resources, making it sustainable for public institutions. Socially, it reduces the digital divide by providing accessible information channels through WhatsApp, the most used messaging platform in Mexico. Environmentally, it contributes to paper reduction by digitizing communication processes. WolfChat aligns with educational innovation frameworks and can serve as a model for nationwide implementation across the DGETI network.

### VII. CONCLUSIONS

The implementation of WolfChat within the DGETI educational system has proven effective in improving communication, optimizing information flow, and reducing administrative workload. Its integration of AI and WhatsApp enables immediate responses to student inquiries, achieving high satisfaction levels and measurable efficiency improvements. WolfChat exemplifies how generative AI can support sustainable digital transformation in education. Future work will focus on extending its functionalities to include academic tutoring, data analytics, and integration with other institutional platforms. The success of this initiative provides a foundation for scaling the model to other states and educational subsystems in Mexico.

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