Anais Estendidos do XX Simpósio Brasileiro de Sistemas de Informação (SBSI 2024)

VI Concurso de Teses e Dissertações em Sistemas de Informação (CTDSI 2024) e VI Concurso de Trabalhos de Conclusão de Curso em Sistemas de Informação (CTCCSI 2024): Dissertação de Mestrado

# Human Factors in the Design of Chatbot Interactions: Conversational Design Practices
# Extended Abstract – CTDSI/CTCCSI 2024

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***Abstract.*** *The conversational nature of chatbots poses challenges to designers since their development is different from other software. Since human dialogue involves several variables beyond verbalizing words, it is vital to design well-thought dialogues for chatbots to provide a humanized and optimal interaction. The main objective of this work is to unveil textual, visual, or interactive design practices from text-based chatbot interactions and how they can potentiate or weaken some perceptions and feelings of users for the creation of the Guidelines for Chatbot Conversational Design (GCCD) guide. We used multiple research methods to generate and validate the guide. First, we conducted a Systematic Literature Review (SRL) to identify conversational design practices and their impacts. These practices were inserted into the GCCD guide through qualitative analysis and coding of SLR results. Then, the guide was validated quantitatively through a survey and qualitatively through a case study. The survey aimed to assess the guide's clarity and usefulness based on its reading and the case study aimed to assess the guide's usefulness based on its practical application. The survey showed that software developers with different levels of experience strongly agreed that the guide could induce greater user satisfaction and engagementm that the guide is clear, understandable, flexible, and easy to use. The case study confirmed the survey findings, as participants reported positive feelings toward the guide and an intention to use it. Their extensive perceptions given through the conducted interviews unveiled that their previous experiences with chatbots and in specific software development positions influenced their design and adoption of practices. The guide proved to be useful for developers with different levels of knowledge, with the potential to become a strong ally for developers in the conversational design process.*

## Introduction

Artificial Intelligence (AI)-based systems are surpassing academic boundaries to be increasingly utilized, primarily to streamline user service delivery and gaining acceptance among users [Khan and Das 2018, Xu et al. 2020]. One type of AI-based system gaining traction across various sectors is the chatbot. Chatbots are intelligent agents powered by machine learning algorithms to mimic human behavior, providing users with ease, speed, and convenience in interactions [McTear 2020, Brandtzaeg and Følstad 2017]. As conversational technology becomes more reliable and efficient, chatbots are becoming integral parts of everyday life, serving various purposes.

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Considering the growing presence of chatbots across diverse sectors, investing not only in natural language understanding algorithms but also in providing enjoyable chatbot interactions for users is crucial. Therefore, conversational design, envisioning and specifying dialogue flows, becomes essential. Well-thought-out conversational design strengthens chatbot objectives across all contexts [Liebrecht et al. 2020, Følstad et al. 2018, Henman 2020] through mutual collaboration between the chatbot and the user, ensuring user satisfaction [Følstad and Brandtzæg 2017].

In this context, investigating chatbot conversational requirements independent of technology, user-centered, and business goal-focused conversations is necessary. Thus, this work conducts a study on chatbot conversational design practices and their impacts on users. The primary goal is to identify textual, visual, or interactive design practices of text-based chatbot interactions and how they can enhance or weaken user perceptions and feelings such as satisfaction, engagement, and trust, for the creation of the Conversational Chatbot Design Guidelines (CCDG) guide.

**Methodology**

This research is structured into six phases: 1) conducting a Systematic Literature Review (SLR) to identify conversational practices and their impacts on users; 2) developing the CCDG guide version 1.0 applying Grounded Theory to data extracted from the SLR; 3) validating CCDG guide version 1.0 through a survey based on the Technology Acceptance Model questionnaire; 4) proposing CCDG guide version 2.0; 5) validating CCDG guide version 2.0 through a case study, where participants will use the guide to improve conversations; 6) proposing CCDG guide version 3.0, the final version.

The guide's construction will be based on SLR results, and its validation and improvement application will be done through a survey and a case study. The survey aims to quantitatively assess the utility and ease of use of the first version of the guide concerning its reading by potential chatbot conversation designers in the context of chatbot conversation design. The case study aims to qualitatively assess the utility and ease of use of the second version of the guide concerning its use by potential conversation chatbot designers in the context of chatbot conversation design.

**Results**

The SLR returned a total of 1101 articles, from which 40 primary studies were selected after applying the protocol, revealing efforts to humanize chatbots and facilitate communication with interactive elements. These practices had an overall positive impact on users. Analysis of selected primary studies revealed patterns in chatbot design aligned with the chatbot's purpose. These patterns formed the basis for the guide, categorized into naturalness, emotionality, and transparency objectives, with associated conversational practices, along with practices to be avoided.

The guide was developed as a web page, presenting and exemplifying each conversational practice in accessible language for professionals without advanced chatbot development knowledge. In the survey validation, participants strongly agreed on the guide's usefulness, ease of use, clarity, and flexibility. Fisher's Exact Test showed no significant differences in responses based on participants' chatbot development experience. Strengths highlighted in open-ended questions included examples, objectivity, and clarity, while improvement suggestions focused on providing deeper examples and implementa-

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tion references for credibility.

For the case study validation, 10 professionals without chatbot development experience participated, modifying conversation samples after being introduced to the guide. Their positions influenced conversation design choices, emphasizing naturalness and human-like interactions. Participants considered technical implementation and user experience, relying on their prior knowledge to select suitable practices.

Overall, participants agreed to use the proposed guide for future chatbot development, with minor suggestions for improvement, mainly related to website layout enhancements. Results suggest the guide's utility across experience levels and domains, though it's limited to text-based chatbots. Future studies should assess the guide's effectiveness in real user interactions, building upon SLR-derived practices.

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