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AI-Driven Digital Transformation in HE Marketing: Opportunities & Challenges in Student Recruitment

Zejneb Osmani,[1,2] Abraham Althonayan[2]

[1]Canadian Institute of Technology, Albania

[2]Brunel University of London, England

zejneb.osmani6@gmail.com, abraham.althonayan@brunel.ac.uk

Abstract

The digital transformation in higher education (HE) marketing has accelerated rapidly after the artificial intelligence (AI) advancement, especially through the integration of generative AI technologies. Institutions are increasingly relying on these innovations to enhance outreach, personalization, and operational efficiency. Among the most promising applications is the use of AI-powered recruitment assistants, capable of providing multilingual, personalized, and real-time support to prospective students and their families. This paper explores the implementation of generative AI within the student recruitment strategy of university, focusing on its capacity to address long-standing recruitment challenges in the higher education sector.

This paper highlights the transformative potential of AI in redefining recruitment paradigms, bridging communication gaps, and strengthening global outreach. It also underscores the necessity for ethical and strategic implementation to ensure transparency, accuracy, ethics and data security in higher education marketing.

To address these issues, Canadian Institute of Technology University College (CIT) implemented an AI-driven recruitment assistant using a Large Language Model (LLM) enhanced with Retrieval-Augmented Generation (RAG). This approach enabled the development of a generative AI ChatBot, named CITBot grounded in CIT's official documentation and web resources, including regulations, academic strategies, and admission procedures.

To assess the impact and user satisfaction, a survey was conducted with high school students and parents who interacted with CITBot during the recruitment process. The results indicated strong acceptance and a high level of willingness among users to adopt the new technology. Participants reported positive experiences regarding the clarity, accuracy, and helpfulness of the information provided. CITBot also proved to be a valuable tool in helping users better understand University's academic offerings and administrative procedures.

Keywords*: AI-driven marketing, generative AI, student recruitment, recruitment assistant, multilingual chatbot, Large Language Model (LLM), Digital transformation in Higher Education Admission*

1. Introduction

The rapid evolution of Artificial Intelligence (AI) has transformed the landscape of higher education marketing and student recruitment. As universities seek innovative strategies to attract a diverse and international student body, the integration of AI technologies, has emerged as a promising solution. One of the most significant applications of this transformation is the development of AI-powered chatbots that simulate human recruiters and operate continuously.

This paper focuses on the implementation of a generative AI-based chatbot at the University College ‘’Canadian Institute of Technology’’, designed to serve as a recruitment assistant. The deployment of AI Chatbot as an intelligent digital assistant is capable of not only answering queries but also provide personalized guidance, enabling institutions to engage with prospective applicants in a more interactive and responsive manner. They can be available round the clock 24/7, delivering instant information, and addressing a wide range of questions and concerns. (Patrick, 2021).

What distinguishes this CITBot from conventional AI tools is its grounding in official CIT documents, regulations, academic strategies, and admission guidelines, ensuring that all responses are not only immediate and contextual but also accurate and aligned with institutional policies.

Multilingual functionality further enhances the CITBot’s accessibility, allowing it to communicate effectively with a broad audience, including non-English speakers and international applicants. This feature is particularly important when addressing parents, who often play a central role in the decision-making process but may face language barriers when seeking information from university websites or human staff.

By simulating the availability and reliability of a human recruiter while maintaining factual precision, the CITBot represents a strategic step forward in digital transformation at CIT. Its implementation is part of a broader institutional effort to streamline communication, enhance user experience, and support inclusive, tech-driven student engagement.

The purpose of this study is to evaluate the effectiveness of a generative AI-powered chatbot in supporting student recruitment efforts at CIT University by acting as a human-like recruiter available 24/7.

Objectives and contributions:

 Evaluate the accuracy and consistency of the chatbot’s responses, ensuring alignment with CIT’s regulations and strategies.

 Determine the level of user satisfaction with the chatbot as a virtual recruitment assistant.

 Explore how effectively the chatbot helps prospective students acquire useful and relevant information.

 Identify key benefits and potential limitations of deploying generative AI in the context of higher education marketing and student recruitment.

2. Literature Review

AI has become progressively prevalent in various sectors, with education being no exception. In recent years, AI technologies have garnered attention for their potential to transform teaching and learning practices in higher education. (Rajasshrie, et al., 2023)

Recent technological advancements combined with the shift towards messaging as a primary channel for both personal and professional communication have contributed to the enormous increase in popularity of chatbots in particular. (Dale, 2016; Følstad, et al., 2017)

A chatbot is a software often integrated with artificial intelligence (AI) to simulate a human in text or voice interaction. Chatbots are generally built for specific tasks such as to virtually assist someone or to help people navigate daily life, etc. (Bradesko, et al., 2012)

Nevertheless, the fact that they can temporarily deal with simple human tasks can greatly reduce overheads for companies and organizations by reducing the need to hire additional employees to do the job. Moreover, employees can have more time to focus on complex tasks, thus increasing productivity and efficiency. (Rouse, 2019)

Universities put great emphasis on the student recruitment process that ensures a constant student pipeline. As a result, Admissions departments are one of the richer areas for the implementation of chatbots in this sector. (Kevin, et al. 2025)

The chatbots have emerged as particularly transformative. Evolving from simple rule-based systems, they have become sophisticated conversational agents through advancements in natural language processing (NLP). (Jürgen, et al., 2023) (Caldarini, et al., 2022)

LLMs, at their core, are an extension of Natural Language Processing (NLP) technologies. These models are trained on vast datasets and have the capability to perform a wide range of tasks, from summarizing articles to conversing in real-time. (Collins, et al., 2005) (Colace, et al., 2018)

Moreover, some of the most important advantages of developing next-generation AI-powered search engines include improvement of search algorithms and personalization. The contextual understanding of LLMs can power search engines to produce more accurate and personalized outputs to user queries. LLMs have attracted significant attention due to their ability to mimic natural human language. (Defne, et al., 2025)
Despite their numerous virtues, LLMs also have some flaws; in particular, it is difficult to update or extend their knowledge and they are prone to hallucinating unintended text. (Lewis, et al. 2020)

These form a serious problem in the use of LLMs for educational purposes, especially the hallucinations, i.e., generating content that is nonsensical or unfaithful to the provided source content. (Ji, et al., 2023)

A capable solution addressing these flaws comes in the form of Retrieval-Augmented Generation (RAG). (Lewis, et al., 2020)

RAG efficiently enhances the performance of LLMs, not by optimizing their training but by integrating information retrieval techniques. (Yu, et al., 2025)

This study contributes to the existing body of knowledge by exploring the implementation of CIT Chatbot, a generative AI ChatBot powered by an LLM and enhanced with RAG. Unlike traditional rule-based systems or general-purpose AI tools, CITBot is grounded in CIT University's official documents.
The CITBot was developed using a customized version of an existing chatbot framework. The system consists of four documents: the CIT website, the CIT Prospectus, the CIT Student Guide, and the CIT Brochure. In the original setup, the messaging interface interacts directly with the chatbot agent. However, in CITBot's design, the communication flow was intentionally modified so that all inputs are routed through the web server. This means that user queries are first received by the messaging interface, passed to the web server, and then forwarded to the chatbot agent. The agent performs intent recognition and sends the matched intent back to the web server, which accesses the knowledge base to formulate an accurate and relevant response.

The chatbot's ability to deliver multilingual, context-aware, and policy-compliant responses makes it a novel contribution in the field of AI-driven education services particularly in environments with diverse student populations and a need for personalized, scalable recruitment communication.
Based on the findings of the literature review, this study proposes that generative AI chatbots can significantly enhance higher education recruitment. Specifically, such systems can increase accessibility through reducing of staff workload through automation, improve the accuracy and consistency of information. This is a clear opportunity for universities, to integrate AI tools like CITBot as scalable, responsive, and trusted recruitment assistants that operate continuously and adaptively. The chatbot's ability to deliver multilingual responses any time of day, makes it a novel contribution in the field of AI-driven education services. Its 24/7 availability, independent of official office hours, ensures that prospective students and parents can receive timely, accurate information without delay, an especially valuable feature for international users across different time zones.

3. Methodology

This study consisted of 25 prospective students and their parents who interacted with the CITBot. The majority 68% of the participants are female and 32% are male. Table 1 provides a summary of participant demographics. A brief demographic questionnaire was used to obtain background characteristics of the participants. Items in this questionnaire requested information on gender, language, country of origin, educational level. The survey included responses from a diverse group of participants, with a balanced gender distribution: In terms of language preference, the majority of respondents preferred English (84%), followed by Albanian (12%), reflecting the multilingual nature of the target audience. Participants originated from various countries, with the largest groups from Albania (80%), Kosovo (8%), while 8% represented other regions. Regarding their educational interests, 60% of respondents were interested in Bachelor-level studies, 40% in Master's programs. This demographic breakdown highlights the importance of a multilingual, culturally adaptable, and responsive recruitment tool like CITBot.

Table 1. Demographic Characteristics

Category	Respondents	Percentage (%)
Gender	Male	32%
	Female	68%
Preferred Language	English	84%
	Albanian	12%
Country of Origin	Albania	80%
	Kosovo	8%
	Other	8%
Educational Level	Bachelor	60%
	Master	40%

Survey Design and Purpose

To evaluate the effectiveness of the CITBot as a virtual university admissions assistant, a post-interaction survey was designed and administered to 25 participants. The primary objective was to assess users' perceptions regarding the chatbot's usability, accuracy, helpfulness, and overall satisfaction, as well as their likelihood of recommending the system to others. The chatbot was developed to function as an interactive agent aligned with the institutional policies and procedures of the Canadian Institute of Technology, providing continuous support to prospective students and parents.

Participants and Procedure

Participants (N = 25) were recruited to test the CITBot under realistic conditions, simulating the role of prospective applicants or guardians seeking information about the university's programs, admissions requirements, and policies. After completing their session with the chatbot, participants were invited to complete a structured questionnaire capturing their experience. Data were collected anonymously to ensure privacy and promote candid feedback.

Survey

The evaluation instrument comprised four items designed to capture key aspects of user experience and satisfaction. Each item corresponded to one of the following domains:

1. **Ease of Use**
   "How easy was it to interact with the chatbot?"
   Response scale: 1 (Very Difficult) to 5 (Very Easy)
2. **Query Understanding**
   "Did the chatbot understand your questions clearly?"
   Response scale: 1 (Never) to 5 (Yes, always)
3. **Informational Value**
   "To what extent did the chatbot improve your understanding of CIT University's programs, policies, or admission process?"
   Response scale: 1 (Made it more confusing) to 5 (Significantly improved)
4. **Recommendation Likelihood**
   "Would you recommend the chatbot to other prospective students or parents?"
   Response scale: 1 (Definitely not) to 5 (Definitely will recommend)

Responses were recorded using a 5-point Likert-type scale, where higher scores indicated more positive evaluations. The questionnaire was administered via spreadsheet, and each row of data corresponded to a single respondent's answers across the four items.

4. Evaluation

Evaluation of User Satisfaction Using Net Promoter Score (NPS)

To quantitatively assess the overall satisfaction, we employed the Net Promoter Score (NPS) methodology. NPS is a widely adopted metric in customer experience research, originally introduced by Reichheld (2003), that measures user loyalty and satisfaction based on a single survey question. A total of 25 participants interacted with the chatbot system and subsequently responded to a single-item survey question designed to measure their satisfaction: "How satisfied are you with the answers provided by the CIT ChatBot?" The NPS framework is be adapted to a 5-point scale as follows:

- Promoters (score = 5): Users who are highly satisfied and likely to recommend the system.
- Passives (score = 4): Users who are moderately satisfied but not enthusiastic.
- Detractors (score = 1–3): Users who are dissatisfied and unlikely to recommend the system.

Based on the collected responses:

- 17 participants rated the CITBot with a 5 (Promoters),
- 3 participants rated it with a 4 (Passives),
- 5 participants gave a rating between 1 and 3 (Detractors).

Using the standard NPS formula:

$$NPS = \left(\frac{Number\ of\ Promoters - Number\ of\ Detractors}{Total\ Number\ of\ Respondents}\right) x100$$

$$NPS = \left(\frac{17 - 5}{25}\right) x100 = 48$$

The resulting Net Promoter Score (NPS) is 48, which indicates a moderately high level of satisfaction among participants. In general, an NPS above 0 is considered positive, and scores above 50 are typically viewed as excellent in-service evaluation contexts. Therefore, a score of 48 suggests that the chatbot system is well-received and performs effectively in addressing users' queries within the scope of student admissions.

Reliability and Effectiveness Analysis

To evaluate the effectiveness of the developed CITBot agent, which was designed in alignment with our university's student admission policies, we conducted a 4 question user survey.

Internal consistency: We first assessed whether the four Likert items formed a coherent scale of "chatbot effectiveness." Cronbach's alpha was calculated on the 25×4 data matrix of responses (values 1–5 for each question). Cronbach's $\alpha = 0.732$ (≈0.73), indicating moderate internal consistency. Cronbach's alpha is a standard measure of scale reliability (i.e. the extent to which items measure the same underlying construct). (Taber, K.S. 2018) Methodologists often consider α values above about 0.65–0.70 acceptable for research purposes, so α≈0.73 suggests the four items are reasonably consistent. (For reference, dropping the first item would raise α to ≈0.91, implying that the first item has somewhat higher variance; however, with all four items retained the scale is acceptably reliable.)

Hypotheses: To what extent is the ChatBot helpful in answering prospective students' questions accurately and satisfactorily, and how much knowledge does it effectively transfer?

- **H_0:** $\mu = 3$ (The population mean rating equals neutral, i.e. CITBot not effective.)
- **H_1:** $\mu > 3$ (The population mean rating is greater than neutral, i.e. CITBot is effective.)

A one-sample *t*-test was used to compare the sample mean against the hypothesized value 3. (Ross, A., Willson, V.L. 2017) We computed each participant's mean rating over the four items to form a single score per person (mean = 4.61, SD = 0.670). Under the null hypothesis, the mean would be 3. The one-sample *t*-statistic is given by $t(24) = (4.61–3.00)/(0.670/\sqrt{25}) \approx 12.02$ (degrees of freedom 24). This *t*-value is extremely large. The corresponding one-tailed *p*-value is about 6.0×10^{-12}, well below the conventional $\alpha = 0.05$ threshold (indeed, $p < 0.001$). Equivalently, a two-tailed $p \approx 1.20\times10^{-11}$ confirms the result is highly significant. Therefore, we reject H_0 in favour of H_1.

- *Test statistic:* $t(24) = 12.02$.
- *p-value:* $p \ll 0.001$ (one-tailed).
- *Effect size:* Cohen's $d = (4.61–3.00)/0.670 \approx 2.40$. By conventional benchmarks (0.2 = small, 0.5 = medium, 0.8 = large), (Magnusson, K. 2023)

Interpretation: The mean rating (≈4.61) is substantially above the neutral midpoint. Statistically, the one-sample *t*-test shows this difference is highly significant, with $p \ll 0.001$ and an extremely large effect size

(d≈2.40). In practical terms, participants rated the chatbot well above average on ease of use, understanding of queries, helpfulness, and likelihood to recommend. Thus, the evidence strongly supports that the chatbot performed effectively (rejecting $\mathbf{H_0}$: μ=3).

Discussion: The Cronbach's α≈0.73 indicates that the four questions tap a common underlying construct (overall chatbot satisfaction), justifying aggregation into a single score. The very high mean rating and large effect suggest users overwhelmingly found the chatbot favourable. Limitations include the modest sample size (n=25) and any non-normality in ratings (the t-test assumes approximate normality). However, the t-test is robust to moderate deviations from normality, and our *t* result is so extreme that minor skew is unlikely to change the conclusion.

Result: Cronbach's α measures scale reliability; values >0.65–0.70 are usually deemed acceptable. The one-sample *t*-test compares a sample mean to a fixed value; here $\mathbf{H_0}$: μ=3 versus $\mathbf{H_1}$: μ>3. Our computed statistics (t=12.02, $p \ll 0.001$, Cohen's $d \approx 2.40$) justify concluding μ>3. This finding supports the usability and reliability of the proposed CITbot agent. The survey data show high internal consistency and a mean score significantly above neutral, indicating strong evidence that the admissions CITBot is effective by user ratings.

5. Conclusions and Recommendations

The primary aim of this study was to design and evaluate an AI-powered recruitment assistant ChatBot that operates 24/7 as a virtual representative of the admissions office at the CIT university. Built using a Large Language Model (LLM) and enhanced with Retrieval-Augmented Generation (RAG), CITBot was grounded in four institutional documents and CIT web page content to ensure that all responses were accurate, policy-aligned, and contextually relevant. The development process involved multilingual integration, a centralized web-based communication pipeline for translation and data flow, and a structured knowledge base tailored to CIT's academic and administrative environment.

To measure effectiveness, a user satisfaction survey was conducted among prospective students and parents. Overall, participants rated the admissions CITBot highly, indicating robust user satisfaction and perceived effectiveness. The average rating across the four measured dimensions (ease of use, query understanding, helpfulness, and likelihood to recommend) was 4.61 (SD = 0.67) on a 5-point scale, which is significantly above the neutral midpoint (one-sample *t*-test: $t(24) = 12.02$, $p < 0.001$) with a very large effect size (Cohen's $d \approx 2.40$). This confirms that users found the chatbot easy to use, helpful, and worthy of recommendation. The internal consistency of these four items was good (Cronbach's α = 0.73), indicating that the survey reliably captured a single underlying attitude toward chatbot effectiveness.

Complementing these findings, the Net Promoter Score (NPS) for the CITBot was 48**,** reflecting a strong majority of promoters and very few detractors among users. An NPS of this magnitude indicates high overall user loyalty and willingness to advocate the chatbot to others. Together, these quantitative results strongly support the conclusion that the admissions chatbot is effective and well-received by its target audience. In practical terms, this positive user reception suggests that the chatbot can enhance the university's admissions process by providing quick, accurate information and by engaging prospective students and their families during the admissions period.

The strong positive evaluations (both statistically and in terms of user advocacy) underscore the admissions CITBot's value. The evidence indicates that our chatbot is effective in meeting users' needs, and it should be deployed as part of the university's digital strategy. Continued monitoring, iterative enhancement, and further study will help ensure sustained performance and inform the next generation of conversational tools in higher education.

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