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Technology-Driven Academic Advising: A Faculty Case Study On Chatbot Integration In The College Of Technological Innovation

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Abstract
Background: *Recent advancements in technology have significantly influenced higher education, particularly in academic advising. Chatbots provide AI-powered conversational interfaces to address high workloads and fragmented advisory systems.*
Materials and Methods: *This study applies the Unified Theory of Acceptance and Use of Technology (UTAUT) framework to analyze faculty advisors' perceptions of chatbot integration in the College of Technological Innovation at Zayed University.*
Results: *Faculty found chatbots beneficial for handling straightforward inquiries, reducing workload, and improving accessibility. However, challenges include database accuracy, usability, and societal alignment.*
Conclusion: *Chatbots enhance efficiency in academic advising but require robust data management and contextual adaptation to meet user expectations.*
Keywords: *Academic advising, chatbot integration, UTAUT framework, higher education, AI in education.*

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I. Introduction

Technological progress has caused significant changes in academic advising systems. Chatbots, described as "Conversational agents…natural language interaction interfaces designed to simulate human conversations using Artificial Intelligence [1] provide personalized support to students, offering timely information and guidance on academic and performance-related issues. Successful integration of chatbots into academic advising depends on technological capabilities, user behaviour, and support systems, [2]

This study aims to explore faculty advisors' perspectives on integrating chatbots into academic advising utilizing the UTAUT framework. The UTAUT model helps understand factors affecting technology acceptance and use, including performance expectancy, effort expectancy, social influence, and facilitating conditions.

II. Research Problem

Academic advising involves personalized study plans, sharing policy information, tracking student progress, and acting as a primary support contact [3]. Advisors often struggle with issues such as high workloads, insufficient knowledge, hesitant students, and scattered information across different systems, [4] [5] define a conversational agent, or chatbot, as a dialogue system capable of understanding and generating natural language content through various modalities such as text, voice, or hand gestures, including sign language. This definition highlights the chatbot's capacity to comprehend and respond to sentences in natural language. [6] further emphasize that these artificial intelligence tools can deal with advising issues by automating routine tasks, consolidating information, offering insights to enhance advising effectiveness and efficiency, and providing student support.

Despite many attempts to develop academic advising chatbots, most focus solely on handling simple questions without analysis or human decision-making. [6] Highlight the limitations of ChatGPT responses, confirming their lack of accuracy and their restriction to direct questions. This suggests the need to review these models and not rely on them exclusively.

Regarding challenges, scholars have identified several challenges in creating chatbots for academic advising. [7] highlight the limitations of personalized advising systems in meeting diverse student needs. [8] and [9] and also highlight the challenge of AI systems struggling to understand complex queries, leading to inaccurate responses. Similarly, [10] discuss user frustration due to the complexity of machine interfaces and inaccurate responses. This issue can affect user trust in the tool, a factor identified as crucial by [11]. Another challenge highlighted by [7] is the importance of user training for effective chatbot use, addressing the same issue of user frustration and trust. Additionally, [6] recognize the need for human oversight to ensure accurate chatbot

interactions. Conversely, [11] address challenges in integrating human advisors within chatbots, which aligns with [12] finding that many users prefer human interaction over machine interaction.

III. Theoretical Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by [13] serves as a theoretical framework. Originating from [14] Technology Acceptance Model (TAM), UTAUT integrates elements to provide a comprehensive understanding of the factors driving successful technology adoption. This model is particularly relevant in examining the factors that influence the acceptance and effective use of technology in educational settings. [13] identified four key constructs as direct determinants of user intentions and behaviour: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions. They also identify four moderating factors—Gender, Age, Experience, and Voluntariness of Use—that influence the impact of these constructs. In this paper, where the research focuses on creating the first version of chatbots, the moderating factors will not be discussed.

IV. Research Paradigm

This case study adopts an interpretivist paradigm to gather qualitative data, focusing on "understanding how individuals perceive their world" [15]. From this perspective human actions are meaningful and can be understood through interpretation. [16] note that "human actions are made meaningful through interpretative frameworks." [17] point out that the interpretivist paradigm centers on personal concerns. Collecting detailed information from knowledgeable individuals enriches the research with more reliable insights.

V. Research Questions

1. How do faculty in CTI at ZU perceive the integration of chatbots in higher education advising?
2. What are the key challenges in designing chatbots to support personalized advising experiences, according to stakeholders?

VI. Methodology

This detailed and descriptive case study, following [18] definition, investigates the potential integration of chatbots into academic advising and identifies the implementation challenges. To ensure consistent and targeted insights, structured interviews were conducted with a purposive sample of expert faculty members experienced in developing chatbots or integrating AI into the educational context. This sampling approach, outlined by [18] meets the specific needs of the research project, ensuring the collection of relevant qualitative data. The decision to focus exclusively on faculty perspectives while omitting students' viewpoints despite their role as end-users was necessitated by the technical nature of the research inquiries, which required insights from specialists in the field. Interviews were held with five faculty members from the CTI at ZU in Abu Dhabi. The three structured face-to-face interviews lasted 40 minutes, and the two Zoom interviews lasted for 45 minutes with guidelines provided in advance, and the conversations were recorded and transcribe.

The study followed Lancaster University's ethical guidelines and ZU's approval, ensuring informed consent and confidentiality. Two-factor authentication enhanced the data protection, and all video recordings were scheduled for deletion six months post-submission.

Analyzing qualitative data involves interpreting it according to the participants' perception of their circumstances. As [16] report, this process entails "understanding data through the lens of participants' views of the situation, identifying patterns, themes, categories, and regularities." It is acknowledged that there is no single correct method for interpreting qualitative data. [19] notes that the absence of a uniform approach to analyzing qualitative data is due to the diverse objectives of researchers. The data analysis process involved connecting each participant's perspective directly to the research questions derived from the theoretical framework of UTAUT. The table (*Figure 1*) presents the link between the collected data and the theoretical framework, facilitating a comprehensive understanding of how participant perspectives align with key constructs of the theory.

UTAUT Model componants	Component-related Questions	Questions
Performance Expectation	Q1,Q2.Q3,and Q7	1- What are your general thoughts on the integration of chatbots in higher education advising?
		2- Can you describe any experiences or interactions you've had with chatbot technology in advising or in other educational contexts? Can you provide specific examples of how chatbots have influenced advising interactions in your experience?
		3- In your view, what are the key considerations or challenges in designing chatbots to effectively support personalized advising experiences for students and faculty?
		7- What technical challenges or concerns do you perceive in implementing chatbots into the current advising?
Effort Expectation	Q5,and Q6	5- How do you think chatbot integration could impact the overall advising experience for students and faculty?
		6- In your opinion, what specific features or functionalities should a chatbot possess to be effective in advising?
Social Influence	Q4, Q8 and Q11	4- How important do you think machine learning algorithms are in improving the effectiveness of chatbots in providing personalized advising?
		8- How do you envision the role of faculty members evolving with the introduction of chatbot technology in advising?
		11-can you discuss any institutional or cultural factors that might influence the successful implementation of chatbots in advising
Facilitating conditions	Q9 and Q10	9- Are there any potential ethical considerations associated with the use of chatbots in advising that you believe should be addressed?
		10- How can conversational technology be tailored to meet the diverse needs of students and faculty in higher education settings?

Figure 1: Links between the collected data and the theoretical framework.

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VII. Reliability And Validity

Enhancing reliability was achieved by constraining interviews within participants' intended parameters. Since open-ended interviews can sometimes compromise reliability due to their lack of structure, [16] suggest that highly structured interviews are the most effective way to improve reliability. Therefore, interviews in this study were structured.

The structured interview format was selected to ensure research validity and reliability. To minimize bias, particularly in questions concerning the role of academic advisors (my role), my intervention during interviews was kept to a minimum. Furthermore, the Assistant Dean cross-checked the research, enhancing its validity. She acknowledged the chatbot's potential to offer personalized advice and save advisors' time but noted that implementing it presents challenges. A thorough study is needed to define tasks and rules, and time is required to build trust for important advising tasks.

VIII. Research Finding

The findings are presented in line with the UTAUT framework.

Performance Expectancy: Participants demonstrated optimism about chatbots' potential but also underscored the importance of realistic expectations and overcoming challenges for successful use in academic advising.[13] identified performance expecqtancy as the strongest predictor of intention, a finding corroborated by [20]. Among participants, perspectives on chatbots' performance expectations varied, reflecting diverse experiences and insights. Participant 1 emphasized the need for a detailed dataset, expecting high performance in straightforward queries and moderate performance in personalized and complex cases. Similarly, Participants 2 and 4 were optimistic about chatbot performance in easy and medium cases but acknowledged usability and technical challenges, aligning with realistic expectations. Participant 3, with moderate performance expectations, emphasized design and technical feasibility, hoping chatbots could lighten workloads. Lastly, Participant 5 acknowledges chatbots' limitations and emphasizes managing expectations and addressing implementation challenges, demonstrating a realistic understanding of performance expectations.

Effort Expectancy: Participants in the study recognized the potential of chatbots to reduce effort in academic advising, with varying perspectives on implementation strategies and concerns about user acceptance and trust. Participant 1 emphasized the role of chatbots in enhancing time and decision efficiency, with attention to consolidating tools and information into a user-friendly interface. This assertion resonates with [20] suggesting that perceived ease of use influences users' intention to use a particular technology. Participant 2 highlighted benefits for faculty and students, stressing workload reduction and increased accessibility to advising support. However, he also underlined the necessity of managing user expectations and minimizing frustration by clear communication. [21] underscores the necessity of building trust among students regarding chatbots. Participant 3 discussed effort from various angles, acknowledging the importance of acceptance, usefulness, usability, and learnability in determining whether students would use chatbots effectively. In parallel, Participant 4 asserted the need for accuracy and usability in chatbots to reduce advisor workload and meet a wide range of student needs. In contrast, Participant 5, doubting whether chatbots would completely replace human advisors, highlighted the value of reliability and consistency in chatbot systems for ensuring user trust, as [22] had done.

Social Influence: [20] pointed out the significance of social influence in technology adoption, a view shared by all participants in this study. Participant 1 highlighted the impact of the UAE's AI integration strategy on shaping attitudes towards AI, stressing the need for visually appealing and user-friendly platforms to enhance acceptance. Participant 2 emphasized the critical role of technological infrastructure and leadership support, alongside machine learning algorithms, in driving chatbot adoption, while also advocating for collaboration between faculty and chatbots to improve advising services. Participant 3 discussed cultural preferences for technology and the role of deep learning in chatbot development, emphasizing the faculty's role in facilitating chatbot use and integration. Participant 4 focused on the importance of exposure, familiarity, and comfort with chatbot

technology, along with the significance of Natural Language Processing (NLP) algorithms and faculty feedback in encouraging acceptance. Lastly, Participant 5 acknowledged cultural diversity but stressed the usefulness of tailoring responses and using machine learning to improve performance, while also highlighting the crucial role of faculty in confirming actions and influencing chatbot reliability.

Facilitating conditions: The participants offered diverse perspectives on the facilitating conditions for chatbot implementation in academic advising. While each of them highlighted different aspects, collectively, they perceived the importance of addressing various conditions for effective integration. Participant 1 emphasized the institution's policy role in creating an environment conducive to AI adoption and saw the importance of addressing ethical issues and providing necessary resources. However, Participant 2 focused on personalizing interactions and addressing privacy and security concerns to enhance acceptance and use. Participant 3 stressed the need for top-down support and data protection, aligning with creating a conducive environment for chatbot implementation. This aligns with [23] assertion that early adopters are primarily influenced by facilitating conditions. Meanwhile, Participant 4 emphasizes the technical need for personalized advising through advanced machine learning algorithms, aware of the importance of privacy, security, and cultural sensitivity. Lastly, Participant 5 underscores the importance of multilingual support, cultural considerations, transparency, and understanding biases in ensuring successful implementation.

IX. Discussion

To answer the research questions, I will discuss faculty perspectives on a personalized academic advising chatbot.

Q1: ***How do faculty in CTI at ZU perceive the integration of chatbots in higher education advising?***

Faculty have high expectations for chatbots in academic advising, particularly in addressing straightforward and moderately complex inquiries. [24] research emphasized the necessity of treating complex cases individually due to the absence of systems capable of accurately comprehending specific student information needs. Faculty emphasize the urgent need for such tools due to the volume of questions students direct to academic advisors. While they acknowledge the potential of artificial intelligence and advanced models like GPT and Gemini in delivering reliable responses, they also stress the importance of an accurate and detailed database to enable the chatbot to effectively address students' questions. Additionally, they highlighted the necessity of gradually creating the chatbot to address challenges and incorporate feedback, contributing to improving its performance over time.

Faculty members illustrated the benefits of integrating chatbots into academic advising systems, including time-saving, workload reduction, and more accessible tools. They emphasize the tool's availability round-the-clock, unlike the limitations associated with human advisors. Furthermore, artificial intelligence's capacity to handle simple and moderately complex queries is noted, given accurate and comprehensive data input. [25] notably illustrate the promising potential of their chatbot model providing career orientation information. In terms of social influence, faculty members recognize and support the UAE and the Ministry of Higher Education's strategies for AI implementation. The UAE's National Strategy for Artificial Intelligence 2031 prioritizes education for development and AI integration, expecting significant contributions to education, economy, and government development, among other sectors [26].

"The AI Strategy will contribute significantly in education, economy, government development,…..) [26]

Faculty noted the conducive infrastructure at ZU and the transformative potential of artificial intelligence, machine learning, and natural language processing in improving chatbot performance. They also stressed the role of academic advisors in training students and providing feedback, highlighting the importance of aligning the tool with societal norms and traditions for successful implementation. They indicated the significance of university policies to facilitate chatbot creation, transparency, privacy, and the responsible handling of student information. They advocated full support from the university's hierarchical structure, technical assistance, and a supportive environment, aligning with UNESCO's recommendations for integrating AI tools in education management. For instance, UNESCO suggests a strategic approach: creating a comprehensive master plan for integrating AI across education management, teaching, learning, and assessment, [27].

Q2: ***What are the key challenges in designing chatbots to support personalized advising experiences, according to stakeholders?***

Faculty at ZU's CTI identified several challenges in designing an effective academic advising chatbot, primarily concerning Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions.

Regarding performance expectations, the faculty covered the challenge of incorporating a high-quality and detailed database capable of providing real-time solutions to scenarios. Even with such a database, creating a chatbot capable of handling complex cases could be challenging. Another challenge lies in ensuring chatbots' performance within the current system, given the complexities and the lack of a common database across different

systems. Similarly, [28] Ashfaq et al. (2020) concluded that participants generally agree that humans excel in addressing many more inquiries than chatbots can, especially when complex situations are involved.

Although faculty are optimistic about the benefits of chatbots for reducing effort and saving time, they noted design challenges. To ensure accurate and immediate information retrieval, chatbots must be easy to use, maintain user interaction, and integrate seamlessly into the university database. Language communication poses another challenge, because chatbots may struggle to translate accurately or understand user terminology. Moreover, keeping pace with database changes is essential to maintaining chatbots' performance. Similarly, [28] asserted that in the context of academic advising chatbots, ease of use refers to the features of the chatbot system that provide simple settings and a user-friendly interface, facilitating seamless interaction and minimizing the cognitive effort and time required to complete a task. Thus, if students using chatbots can complete their tasks efficiently, they are likely to prefer using the technology.

Regarding social influence, academic advisors noted that the UAE has a strong technological environment that supports technology and artificial intelligence. However, it is challenging to build individuals' trust and ensure that chatbots align with Emirati society's customs and traditions. Policies and decisions play a crucial role in supporting these tools, and a supportive environment is necessary for their success. Chatbots must be user-friendly and akin to applications used in daily life or social media. In [29] study, social influence strongly impacts the behavioural intention to accept advising chatbots, including peer influence and environmental factors. Students prefer chatbots with social-emotional intelligence. The study also aligns with the faculty in ZU in believing that universities should promote chatbot adoption as a social norm, as promoted by student peers.

X. Conclusion

A key limitation of current academic advising chatbots is their inability to cope with highly complex and personalized student cases. While they excel in addressing straightforward inquiries, situations requiring a nuanced understanding of specific student backgrounds, intricate program requirements, or multifaceted personal circumstances are beyond them. To overcome this limitation, continued research is needed to develop models capable of comprehending and reasoning about complex contextual information. Another promising direction is exploring hybrid models that combine chatbot assistance with human advisor input for intricate cases.

This study's findings are limited to the College of Technological Innovation (CTI) at Zayed University (ZU), representing only one college within the university. Addressing these limitations is crucial for realizing the full potential of chatbots in providing truly personalized and effective academic advising experiences across diverse academic settings.

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