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AI am Motivated: Leveraging Self-Determination Theory in Chatbots

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ABSTRACT: Artificial intelligence (AI)-powered chatbots promised to streamline administrative tasks and offer just-in-time support within higher education institutions. However, many existing chatbots prioritised simple information delivery over the cultivation of deeper student engagement and intrinsic motivation. This paper argued that Self-Determination Theory (SDT), a prominent framework for understanding motivation, offered a robust model for designing chatbots that went beyond passive answering to become active facilitators of student agency. SDT emphasised three core psychological needs: autonomy, competence, and relatedness. This paper explored how the intentional integration of these needs into chatbot design could transform administrative support interactions into opportunities to empower students as self-directed learners.

KEYWORDS: GenAI technology; perceptions; GenAI tertiary use; GenAI ethics

1. Introduction

Artificial intelligence (AI) held transformative potential for streamlining student support services within higher education. AI-powered chatbots could automate routine inquiries, provide on-demand information, enhance service accessibility outside of traditional working hours, and potentially alleviate pressure on staff [1, 2]. These chatbots offered a compelling way to address administrative tasks and free up human staff for interactions that required deeper expertise and empathy.

However, many existing chatbots focused primarily on delivering information in a question-and-answer format [3, 4]. This approach, while useful, missed a crucial opportunity to cultivate student agency, intrinsic motivation, and deeper engagement with the learning process. When designed with these goals in mind, AI chatbots could do more than simply answer questions; they could become active partners in fostering student self-direction by providing personalised learning paths, encouraging critical thinking, and offering real-time feedback [5, 6]. By acting as virtual mentors, chatbots could empower students to take ownership of their learning and cultivate the skills necessary for independent study and lifelong learning.

Self-Determination Theory (SDT), a prominent theoretical framework within educational psychology, had long provided a powerful lens for understanding motivation [7, 8]. SDT proposed that intrinsic motivation and well-being flourished in environments that supported three core psychological needs: autonomy, competence, and relatedness [8]. This suggested that beyond mere efficiency gains, administrative interactions could be redesigned to empower students within their broader learning journey, particularly as these needs remained central to modern educational practices [9].

Educational research offered extensive support for SDT's core principles. Studies had consistently linked autonomy-supportive environments with increased motivation, achievement, and overall well-being in learners [14, 15]. Similarly, fostering competence through targeted feedback and scaffolding had been shown to enhance student engagement, persistence, and positive self-perceptions [1, 10, 11].

Furthermore, SDT's emphasis on relatedness—the need to feel connected, understood, and part of a community—had important implications for enhancing the student experience [8]. Building a sense of connection and belonging had been empirically linked to greater motivation and overall well-being across diverse learning contexts [1, 9, 12]. Within the context of seemingly mundane administrative tasks, there was potential for chatbots to make students feel seen and cared for. This could include recognising and responding to expressions of stress or frustration, or proactively connecting students with resources and opportunities that aligned with their needs and interests.

This paper proposed that by intentionally embedding the principles of SDT into the design and functionality of AI chatbots, their potential as facilitators of student empowerment could be unlocked, positively impacting not only the efficiency of administrative tasks but also students' broader engagement and motivation within their learning environments.

2. Methodology

This paper presented a conceptual exploration of how the principles of Self-Determination Theory (SDT) could be translated into concrete chatbot design features and interaction patterns aimed at administrative support. A literature review was initiated by identifying and analysing meta-analyses and systematic reviews to establish a foundational understanding of research on educational chatbots. This approach allowed the study to build on existing research by focusing on relevant studies concerning AI in education, Self-Determination Theory (SDT), and metacognition. The primary keywords, "AI in education," "educational chatbots," and "motivation and metacognition in chatbots", guided the search across databases including IEEE Xplore and Scopus. Thematic analysis was then employed to distil key patterns and themes from the selected literature [2]. The study thus built upon this established theoretical grounding to propose a conceptual model for embedding the motivational principles of SDT into the core functionality of educational chatbots. Each key element of SDT was examined using illustrative examples.

2.1. Autonomy in chatbot design.

Autonomy, within the SDT framework, referred to a sense of volition and ownership over one's actions [14]. Educational research had consistently demonstrated a positive link between autonomy support and student motivation, achievement, and well-being [1, 13]. AI chatbots designed for administrative support could promote student autonomy in several ways:

- Offering Choices: Instead of prescribing a single pathway, the chatbot could provide options for how students received information or completed administrative tasks [1]. This approach demonstrated respect for students' preferences and allowed for adaptation to individual learning styles.
- Personalisation: With the ethical use of student data, the chatbot could adapt its interactions and recommendations based on students' previous inquiries, course enrolments, or profile information [13]. Responsiveness to individual contexts reinforced students' sense of agency.
- Student-Directed Exploration: Rather than merely providing answers, the chatbot could encourage students to formulate their own questions about administrative processes. This approach guided information-seeking behaviour and nurtured student initiative.

To illustrate how autonomy could be supported through administrative interactions, the following scenarios were proposed:

- Scenario 1: Extension Request
  Student: "I need an extension on my assignment."
  Chatbot: "I can help with that. Would you like to see the extension policy for your course, draft an extension request email, or be connected directly with the student support office?"
- Scenario 2: Finding Campus Resources
  Student: "Where can I get my student ID printed?"
  Chatbot*:* "There are a few options. Would you like directions to the student services office, their hours of operation, or a link to the online ID replacement request form?"

2.2. Competence in chatbot design.

The second core need identified by SDT was competence—the feeling of effectiveness and mastery over one's actions [14]. Within educational contexts, supporting student competence had been linked to increased engagement, effort, and positive self-perceptions [15]. AI chatbots could foster a sense of competence in administrative tasks by providing targeted guidance and feedback:

- Submission Assistance: Instead of merely directing students to a submission link, chatbots could reinforce students' ability to navigate the process successfully. For example, a chatbot could provide clear instructions while affirming the student's understanding at each step, thereby building confidence and system literacy [1, 12].
- Scaffolding Based on Need: When students indicated difficulty, chatbots could offer tiered support, such as definitions, step-by-step walkthroughs, or guided practice with hints and explanations [14, 15]. This customisation positioned learners as active participants in the learning process and promoted mastery.
- Just-in-Time Knowledge Boosts: Chatbots could provide context-specific explanations when unfamiliar terminology or concepts appeared, allowing students to maintain focus without disrupting their workflow [15].
- Scenario 1: Submission Guidance

Student: “I’m not sure how to submit my assignment on Blackboard.”
Chatbot: “Absolutely! Let’s go through it together. First, have you logged into Blackboard and located the correct unit?”

- Scenario 2: Practice and Scaffolding
  Student: “I’m struggling with financial analysis concepts.”
  Chatbot: “Let’s break it down. Would you like to start with a definition review, a step-by-step example, or a practice quiz with hints and explanations?”
- Scenario 3: Just-in-Time Definition
  Student: “What does pro bono mean in this legal article?”
  Chatbot: “Pro bono refers to professional work undertaken voluntarily and without payment. Would you like a more detailed explanation of its relevance in legal practice?”

2.3. Relatedness in chatbot design.

Relatedness, within SDT, underscored the fundamental human need to feel connected, understood, and cared for [8]. In educational settings, a sense of belonging had been linked to increased motivation, persistence, and overall well-being [1, 16]. Although chatbots could not replace human interaction, they could support relatedness by demonstrating empathy, fostering community connections, and adopting a teachable-agent role.

- Empathetic Responses: Chatbots could be programmed to recognise and respond to expressions of stress or frustration, acknowledging emotions while offering relevant resources or options [15].
- Fostering Community Connections: Drawing on institutional knowledge, chatbots could proactively connect students with relevant programs, events, or support services aligned with their interests or needs.
- Teachable Agent Role: Chatbots could temporarily adopt a learner role, allowing students to explain processes or concepts. This role reversal fostered a sense of contribution, mastery, and social connection [1].
  - Scenario 1: Emotional Support
    Student: “I’m feeling overwhelmed with upcoming exams.”
    Chatbot: “I’m here to help. It sounds like you’re under a lot of pressure. Would you like to plan a study schedule together or explore stress-management resources?”
  - Scenario 2: Beyond Basic Answers
    Student: “Is there parking near the library?”
    Chatbot: “Yes, here’s a map of nearby parking areas. The library can get busy during peak times—would you like me to check current occupancy levels?”
  - Scenario 3: Teachable Agent Interaction
    Student: “I’m confused about enrolling in units for next semester.”
    Chatbot: “Let’s work through it together. Could you explain what you understand so far about the enrolment process? I’ll ask questions as we go.”

3. Results and Discussion

The integration of Self-Determination Theory (SDT) into the design of administrative support chatbots held significant potential to transform these interactions into opportunities that empowered students. This approach moved beyond the traditional role of chatbots as mere information providers and instead fostered deeper engagement by supporting the development of student autonomy, competence, and relatedness. Such a shift in design philosophy reflected a more holistic view of student support, aligning technological advancements with the fundamental psychological needs outlined in SDT [8].

3.1. Autonomy: choices and personalisation.

Administrative processes within educational institutions were frequently rigid, often failing to accommodate the diverse needs and individual circumstances of students. An SDT-informed chatbot addressed this rigidity by offering choices, thereby empowering students to take greater control of their administrative journeys. For example, when faced with the task of requesting an assignment extension, the chatbot did more than simply present the relevant policy; it provided multiple pathways for the student to follow. These options included drafting an extension request email using a guided template, accessing a detailed explanation of the extension process, or connecting directly with a student support officer [1, 13]. By offering such choices, the chatbot supported student autonomy and encouraged a more active role in the educational experience [8].

3.2. Competence: scaffolding and just-in-time support.

Administrative tasks often overwhelmed students, particularly when they involved complex procedures or unfamiliar terminology. This frequently eroded students' sense of competence, leading to frustration and disengagement [4, 10]. A chatbot designed around SDT principles mitigated these challenges by offering targeted support that scaffolded students' understanding and ability to navigate administrative tasks. For instance, when students struggled with assignment submission processes, the chatbot provided step-by-step guidance, ensuring that each stage was clearly understood before progressing further [17]. In addition, the chatbot offered just-in-time assistance by proactively supplying definitions or explanations when students encountered challenging concepts. This approach reinforced students' sense of competence and mastery over the task at hand [17, 18, 19]. The effectiveness of these interactions was further enhanced by advanced Natural Language Processing (NLP) technologies, which enabled chatbots to interpret and respond to student queries in nuanced and contextually appropriate ways [6].

3.3. Relatedness: beyond functional assistance.

Although chatbots could not replace the depth and richness of human interaction, they nevertheless played an important role in cultivating a sense of relatedness and empathy. This was particularly relevant in administrative contexts, which were often perceived as impersonal or transactional [14]. By recognising and responding to students' emotional cues such as expressions of frustration or confusion, a well-designed chatbot offered more than functional assistance. It acknowledged students' feelings, provided encouragement, and suggested relevant resources or support services tailored to both emotional and academic needs [8, 10,

14]. Through these interactions, the chatbot helped foster a sense of connection and belonging, which SDT identified as essential for motivation and well-being [14].

3.4. Benefits, challenges, and the road ahead.

An SDT-based approach to administrative chatbot design offered numerous benefits for students, including increased engagement, motivation, and a more personalised educational experience [14, 16]. By fostering autonomy, competence, and relatedness, chatbots transformed routine administrative tasks into opportunities for meaningful interaction. When students were given choices in managing administrative processes or received timely support that enhanced their understanding and confidence, they were more likely to feel empowered and motivated throughout their educational journeys [9, 17]. However, the implementation of such chatbots was not without challenges. Developing systems capable of accurately and sensitively responding to diverse student needs required advanced NLP capabilities, which continued to evolve [4, 6]. Moreover, ensuring data privacy and the ethical use of student information remained critical concerns. As chatbots became increasingly integrated into student support systems, careful attention had to be paid to data collection, storage, and use, with transparency and informed consent as key priorities [1, 16]. Further research was required to empirically validate the effectiveness of SDT-based chatbots in enhancing student motivation and well-being. While the theoretical foundation was robust, real-world implementations and longitudinal studies were essential to assess the long-term impact of these technologies on student outcomes [14].

4. Conclusions

Transforming student-facing chatbots from rudimentary information providers into active facilitators of student agency was within reach. While existing educational chatbots often prioritised knowledge delivery over the cultivation of intrinsic motivation, this paper made a strong case for integrating Self-Determination Theory (SDT) as a guiding framework for the design of administrative support chatbots. By supporting autonomy, competence, and relatedness, these tools could be reimagined to empower students not only to complete administrative tasks but also to become active participants in their learning journeys. In response to the need for stronger empirical evidence supporting the effectiveness of AI chatbots in fostering SDT-related needs, the authors initiated the development of a prototype AI chatbot. This chatbot was undergoing testing at the time of writing and utilised secure data sources while grounding its design in both Self-Determination Theory and Self-Regulated Learning (SRL) frameworks. Preliminary findings from this ongoing research indicated promising potential for enhancing student engagement and autonomy through tailored and responsive interactions. Further research and development were required to address the technical and ethical considerations associated with this shift; however, the potential for enhancing the overall student experience was substantial. This approach aligned with the evolving nature of university support services in the age of artificial intelligence, prioritising not only operational efficiency but also the cultivation of a holistic and student-centred support environment.

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Author Contributions

All authors contributed equally to the conceptualization, design, analysis, and interpretation of the study. All authors participated in drafting and critically revising the manuscript, and all have read and approved the final version.

Competing Interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

No new data were created or analysed in this study. Data sharing is not applicable to this article.

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