

How International Students Use Generative AI as a Sociocultural Adaptation Strategy and Its Impact on Academic Performance:A Cross-Cultural Study

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Abstract

With the deepening internationalization of higher education, the sociocultural adaptation of international students has become an increasingly important research topic. However, existing studies have paid limited attention to how international students utilize emerging technological resources to address adaptation challenges. Grounded in sociocultural adaptation theory, this study adopted a qualitative exploratory design, employing purposive sampling to recruit approximately 12 international master's students from non-English-speaking countries studying in English-medium higher education environments. Data were collected through semi-structured interviews and analyzed using thematic analysis. The study addressed two research questions: Do international graduate students use generative AI as a sociocultural adaptation strategy? How does generative AI function as a mediator in their adaptation process? Findings reveal that international master's students clearly employ generative AI as a strategic resource for sociocultural adaptation. At the language level, AI assists students through real-time text optimization and expression suggestions; at the cultural norm level, AI provides scenario simulations and behavioral demonstrations to help decode implicit academic rules; at the social interaction level, AI compensates for limited interpersonal networks by offering strategic communication advice. This study extends sociocultural adaptation theory by incorporating generative AI as an actionable strategic resource, providing new theoretical perspectives and practical references for understanding technology-mediated cross-cultural adaptation processes.

Keywords

Generative Artificial Intelligence; International Students; Sociocultural Adaptation; Adaptation Strategies; Cross-Cultural Education; Higher Education.

1. Introduction

With the continuous internationalization of higher education, the issue of international students' sociocultural adaptation has become an important topic in both cross-cultural and higher education research. Previous studies have shown that international students need to constantly understand and adapt to new social norms, communication styles, and academic cultures in their host countries to participate effectively in social and daily interactions [1,2]. This process is often accompanied by language barriers, cultural misunderstandings, and uncertainty in interactions, which create ongoing adaptation pressures.

However, although existing research has examined international students' sociocultural adaptation from the perspectives of interpersonal support, institutional environment, and individual competence, the understanding of the specific types of resources students rely on during the adaptation process remains limited. In particular, in today's context where digital

technologies are deeply embedded in learning and communication practices, little systematic attention has been paid to how international students use emerging technological resources to cope with sociocultural adaptation challenges.

In recent years, generative artificial intelligence (AI) has rapidly spread in higher education, significantly affecting students' information access, learning approaches, and communication practices. Existing research mainly treats generative AI as a learning support tool, focusing on its role in improving learning efficiency or assisting academic writing [3]. However, whether and how international students use generative AI as a strategic resource for sociocultural adaptation remains underexplored. Based on this, the present study adopts a sociocultural adaptation perspective to examine how international master's students use generative AI in cross-cultural contexts and the significance of such practices.

2. Literature Review

Overall, existing studies provide a clear picture of international students' sociocultural adaptation, highlighting both the challenges they face and the strategies they use to navigate new academic and social environments. Research has examined adaptation from multiple angles, including theoretical perspectives, students' lived experiences, and emerging technological resources. However, a systematic understanding of how new tools like generative AI fit into adaptation strategies remains underdeveloped.

2.1. Sociocultural Adaptation Theory and Adaptation Strategies

Sociocultural adaptation theory focuses on how individuals, after moving across cultures, learn the necessary skills and social norms to participate effectively in daily interactions in a new environment. This theory, systematically developed by Ward and colleagues, emphasizes that adaptation is not merely a change in attitudes or psychological states, but is reflected in practical abilities and behaviors in specific contexts [4]. In higher education, sociocultural adaptation has been widely used to explain how international students adjust to classroom participation, academic communication, and daily campus life. The core concern is whether students can understand social norms in specific situations and act appropriately. Previous studies show that students' adaptation in academic discussions, classroom interactions, and teacher-student communication often depends on their understanding of implicit cultural rules and situational expectations, not just their language ability.

Within this theoretical framework, "adaptation strategies" are generally understood as concrete, actionable behaviors and resource-use practices that individuals adopt to cope with challenges in a new cultural environment. The goal is to enhance functional performance [5,6]. These strategies are highly situational and practical, often adjusted according to environmental demands, interaction partners, and available resources. Since sociocultural adaptation theory emphasizes flexible behavioral responses and skill development, it provides a theoretical space for including new types of adaptation resources, such as technological tools, in understanding how individuals navigate adaptation processes.

2.2. Sociocultural Adaptation Experiences of International Graduate Students

Existing research has extensively explored the sociocultural adaptation experiences of international graduate students, focusing mainly on language development, academic socialization, and classroom interaction and participation [7,8]. Studies indicate that graduate-level learning requires a high degree of autonomy and the ability to understand and follow implicit academic norms, which pose significant challenges for international students.

For students from non-English-speaking countries, studying in an English-medium environment further increases these adaptation difficulties. Language is not only a tool for communication but also a medium for understanding academic norms, participating in

discussions, and establishing an academic identity. Research shows that limited language proficiency or insufficient understanding of academic culture can affect classroom participation and the quality of academic interactions, thus structurally constraining sociocultural adaptation [9].

2.3. Generative Artificial Intelligence in International Student Contexts

With the increasing use of generative AI in higher education, a growing body of research has begun to examine how international students engage with this technology in their academic practices. Existing studies predominantly conceptualize generative AI as a learning support tool, focusing on its role in academic writing assistance, language comprehension, feedback generation, and course content organization [10-12]. Empirical findings generally suggest that generative AI can enhance learning efficiency, provide linguistic scaffolding, and alleviate language-related anxiety among students studying in a second language [13,14].

However, this line of research largely frames generative AI as a cognitive or instrumental resource, with limited attention to how students strategically deploy AI within specific sociocultural contexts to navigate adaptation challenges. In particular, the potential of generative AI to support the interpretation of implicit academic norms, simulate academic interactions, or compensate for limited interpersonal and institutional support has remained underexplored. As a result, existing studies tend to privilege outcomes related to performance and efficiency, while overlooking the broader sociocultural functions of generative AI in international students' everyday academic and social practices [15,16].

2.4. Research Gaps and Research Questions

Overall, the literature shows that while sociocultural adaptation research has systematically revealed international graduate students' adjustment processes, and studies on generative AI have begun to explore its applications in higher education, theoretical dialogue between these two areas remains limited. In particular, generative AI has not yet been systematically incorporated into the sociocultural adaptation framework as a potential adaptation strategy.

Based on this, the present study focuses on the following research questions:

RQ1: Do international graduate students use generative AI as a sociocultural adaptation strategy?

RQ2: How does generative AI function as a mediator in the sociocultural adaptation process of international graduate students?

By addressing these questions, this study aims to bridge the theoretical gap between research on sociocultural adaptation and studies on generative AI.

3. Methodology

This study explores how international graduate students use generative AI as a sociocultural adaptation strategy. A qualitative, exploratory approach was used, combining purposive sampling, semi-structured interviews, and thematic analysis to capture in-depth experiences and practical adaptation strategies.

3.1. Research Design

This study adopted a qualitative, exploratory design to understand how international graduate students use generative AI for sociocultural adaptation and how they construct the meaning of these practices in specific educational contexts. Compared with quantitative research, which emphasizes variable relationships and statistical inference, qualitative research is better suited to uncover individual experiences, strategy choices, and the underlying logic in real-life contexts, especially for social phenomena that are not yet fully

theorized [17]. Therefore, this design can effectively address the research question of whether and how generative AI is used as a sociocultural adaptation strategy.

Furthermore, since the use of generative AI in international students' sociocultural adaptation has not yet been systematically theorized, this study is positioned as exploratory. Its goal is to provide conceptual clarification and an analytical framework for future larger-scale or mixed-methods research rather than to test generalizable conclusions [18].

3.2. Participants and Sampling

The study focused on international master's students from non-English-speaking countries who are enrolled in English-medium higher education institutions. Participants were not selected based on specific disciplines, but rather on their overall sociocultural and academic adaptation experiences.

Compared with undergraduate or doctoral students, international master's students typically enter intensive, assessment-heavy programs at the beginning of their studies. They need to quickly understand and respond to new academic norms and interaction styles before fully completing academic socialization. This "short-cycle, high-intensity" structure concentrates their sociocultural adaptation experiences, making specific adaptation practices more apparent.

Although different disciplines vary in teaching and assessment methods, research shows that international students face common adaptation challenges across disciplines, including language use, classroom interaction, understanding academic norms, and social engagement with peers and faculty. Therefore, limiting the study to specific disciplines is not necessary to understand the adaptation process.

Generative AI, as a cross-contextual adaptation resource, supports language, information comprehension, and norm interpretation, and its use does not depend on disciplinary knowledge. This further justifies the decision not to select participants by discipline.

A purposive sampling strategy was employed to deliberately select participants who could provide information-rich cases. This approach is widely considered suitable for qualitative research, particularly when the goal is to gain an in-depth understanding of specific experiences rather than to make representative inferences [19]. Inclusion criteria were: (1) being a master's student; (2) native language not English; (3) currently studying in an English-medium higher education environment; and (4) having used generative AI in learning or daily adaptation.

In total, approximately 12 participants were interviewed. The sample size was determined based on the principles of information sufficiency and theoretical saturation, meaning data collection continued until no substantial new themes emerged [20]. This approach emphasizes analytical depth rather than sample size, consistent with the methodology of exploratory qualitative research.

3.3. Data Collection

Data were mainly collected through semi-structured interviews. This method ensures consistent coverage of research topics while allowing participants to freely describe their experiences. It also provides the researcher opportunities for follow-up and clarification, helping capture sociocultural adaptation experiences with contextual depth [21].

Interviews focused on participants' sociocultural adaptation in English-medium environments, emphasizing challenges in language and academic communication, understanding implicit academic and cultural norms, and how generative AI was used in these contexts. Aligning interview topics with research questions helped focus data collection on the practical use of generative AI as a potential adaptation strategy.

All interviews were conducted with informed consent, recorded, and transcribed verbatim to ensure data completeness and accuracy.

3.4. Data Analysis

Thematic analysis was used to systematically analyze the interview data. Thematic analysis is a flexible and systematic qualitative method suitable for exploratory research, allowing the identification of recurring patterns and practices without imposing pre-determined theoretical categories [22].

The analysis process involved several steps: first, reading transcripts multiple times to become familiar with the data; second, performing initial coding on segments related to sociocultural adaptation and generative AI use; third, grouping similar or related codes into higher-level themes, focusing on the functions and mediating roles of generative AI in different adaptation contexts; and finally, iteratively comparing participants' accounts to refine themes, forming an analytical understanding of generative AI as a sociocultural adaptation strategy [23].

The analysis was guided by the research questions, emphasizing the interpretation of adaptation processes and the meaning of strategies rather than counting the frequency of behaviors.

This study adopted a context-bounded approach, focusing on individuals' sociocultural adaptation experiences in a specific educational setting rather than making generalizations about all international graduate students. The core value of qualitative research lies in revealing possible mechanisms of social phenomena rather than providing statistically representative conclusions [24]. Therefore, the findings should be understood as an initial exploration of the potential role of generative AI in sociocultural adaptation, providing theoretical and methodological reference for future research in different cultural and educational contexts.

4. Outcome Analysis

The results of this study show that international master's students clearly use generative AI as a strategic resource in their sociocultural adaptation (RQ1). Participants reported extensive use of generative AI in language expression, understanding academic norms, and social interactions, demonstrating its practical function in coping with cross-cultural challenges. This finding aligns with the core logic of sociocultural adaptation theory, which emphasizes that adaptation is not just a change in attitudes or psychology, but a process realized through concrete behaviors and practical skills. In this sense, generative AI is incorporated into students' adaptation toolkit, serving as an active means to manage language barriers, cultural uncertainty, and interaction pressures.

Regarding RQ2, the study reveals the multi-level mediating role of generative AI in sociocultural adaptation. First, in the language dimension, AI assists students by providing real-time text optimization, expression suggestions, and examples, helping them communicate more accurately in class discussions, academic writing, and daily interactions, thus reducing adaptation challenges caused by language difficulties. Second, in understanding cultural norms, AI offers scenario simulations, case analyses, and behavioral demonstrations, enabling students to decode implicit academic rules and social expectations, strengthening the adaptation pathway from "situational understanding" to "behavioral practice". Third, in terms of social interaction support, generative AI compensates for limited interpersonal networks or insufficient guidance from mentors, providing strategic communication suggestions that help students respond flexibly to cross-cultural interactions, thereby enhancing the practicality and contextual relevance of their adaptation strategies.

Overall, the role of generative AI in international students' sociocultural adaptation shows an integrated effect across language, cultural understanding, and social interaction. It not only enhances cognitive capacity but also provides strategic support, allowing students to cope with adaptation pressures on multiple levels. These findings directly address the two core research questions and extend sociocultural adaptation theory to include new technological resources. Therefore, generative AI is not merely a learning aid but also an actionable strategic resource, offering practical support for international students' daily life and academic practice in cross-cultural contexts, and providing theoretical and practical references for future research on technology interventions in higher education.

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