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Exploring High School Students' Transition from Traditional Search Engines to ChatGPT for Course Learning: A Push-Pull-Mooring Model Perspective

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Abstract: This study explores the shift in behavior among high school students from traditional search engines to ChatGPT for learning support, using the Push-Pull-Mooring (PPM) model. Push factors include habit inertia, which may inhibit students from adopting new technologies. Pull factors, such as system and information quality, attract students to ChatGPT due to its efficiency and accuracy. Mooring factors, like switching costs, influence the transition. AI literacy is considered as a moderating variable. The research aims to identify key factors affecting students' switching behavior and the impact of AI literacy on this transition.

Keywords: AI, ChatGPT, PPM Model, High School Students, Technology Adoption

1. Introduction

The rapid growth of Artificial Intelligence and generative AI has greatly affected our daily habits, especially in education. Traditional search engines offer a lot of information, but gathering and integrating data manually takes time and effort. In contrast, generative AI tools like ChatGPT offer a conversational user interface, significantly enhancing the efficiency of information retrieval and synthesis, making them invaluable aids for learners (Strzelecki, 2023). ChatGPT, developed by OpenAI in the United States, is one of the most advanced AI chatbots (Taechar-ungroj, 2023). It generates human-like responses through extensive training on text data, such as books and news sources (Kung, 2023). AI technology in education has enhanced teaching quality and revolutionized traditional learning methods. Unlike traditional search engines, ChatGPT provides an interactive, conversational interface that significantly speeds up data collection and synthesis.

This study uses the Push-Pull-Mooring (PPM) model to investigate high school students' shift from traditional search engines to ChatGPT for learning. Originally proposed by Bogue (1959) for migration studies, the PPM model has since been widely applied in analyzing user behavior related to technology adoption. The theory posits that factors influencing users' behavior change can be categorized into push, pull, and mooring factors (Nayak et al., 2021). Analyzing the driving, restraining, and stabilizing factors pertinent to the matter at hand. For examining students' transition from traditional search engines to ChatGPT for classroom learning assistance, the PPM model is particularly appropriate, as previous studies have utilized this theory for similar analyses (Hou & Shiau, 2020; Lin et al., 2021).

Regarding push factors, "habit" refers to the influence of users' established routines on their behavior patterns. In the context of high school learning, students' habitual use of traditional search engines may create inertia that hinders their willingness to adopt new technologies. However, this inertia may be broken as learning needs evolve (Xu et al., 2021). Regarding pull factors, system quality, and information quality are key attractions for students to switch to generative AI tools like ChatGPT. ChatGPT's advantages in system efficiency and

response accuracy make it an appealing alternative to traditional search engines for learning (Kang et al., 2021). Mooring factors include switching costs, which refer to the potential costs students may incur when transitioning from one technology to another, such as the time and effort required to learn how to use a new tool (Dogra et al., 2022).

The study focuses on high school students' willingness to switch from traditional search engines to using ChatGPT for learning assistance. The factors influencing this behavior are habit, system quality, information quality, and switching costs. Additionally, AI literacy, as a moderating variable, may influence students' acceptance of and intention to use ChatGPT (Lin et al., 2021). Therefore, based on the research objectives, this study proposes the following research questions:

1. What factors influence high school students in the transition from using traditional search engines to ChatGPT for classroom learning assistance?

2. Does AI literacy strengthen high school students' transition behavior to using ChatGPT?

This study is based on the PPM theoretical framework and focuses on high school students to identify key factors influencing their transition behavior. The subsequent chapters will cover a literature review, hypothesis development, research model and questionnaire design, and anticipated research results based on findings.

2. Literature Review and Hypothesis

The push factor primarily includes students' habitual use of traditional search engines (relationship inertia). According to Xu et al. (2017), habitual use creates inertia, which can inhibit users' willingness to adopt new technologies. For high school students, the habitual use of traditional search engines for classroom learning has become their fixed behavior pattern, and this habit can act as a barrier to transitioning to new technologies, such as ChatGPT. However, as learning needs evolve, this inertia may be disrupted, thereby creating a push force that drives students to seek new learning tools. Based on the above discussion, this study proposes the following hypothesis.

Hypothesis 1: High school students' strong reliance on traditional search engines may impede their willingness to adopt newer technologies like ChatGPT.

Pull factors are positive elements that attract users to new technologies. In this study, the pull factors focus on the system quality and information quality of ChatGPT. Kang et al. (2021) pointed out that ChatGPT has advantages in system efficiency, response speed, and accuracy, making it attractive for learning assistance. Additionally, ChatGPT can provide more accurate and relevant information, which meets students' learning needs and becomes a key reason for their transition from traditional search engines to ChatGPT. Therefore, based on the above arguments, this study proposes the following hypotheses:

Hypothesis 2: The better the perception of ChatGPT's system quality, the more positive the influence on high school students' intention to transition to using ChatGPT for learning assistance.

Hypothesis 3: The better the perception of ChatGPT's information quality, the more positive the influence on high school students' intention to transition to using ChatGPT for learning assistance.

In our study, we are focusing on switching costs as the primary mooring factor, which refers to the time and effort students need to invest when transitioning from one technology to another (Dogra et al., 2022). For example, learning to use ChatGPT might create anxiety and hinder the transition process for students. However, if the benefits of using ChatGPT outweigh these costs, students are more likely to make the transition.

Hypothesis 4: The higher the switching costs, the lower the likelihood of high school students transitioning from traditional search engines to ChatGPT.

Understanding AI plays a crucial role in shaping students' attitudes toward new technologies like ChatGPT. Research shows that students with higher AI literacy exhibit more confidence in using such innovations and are more open to embracing them. Strengthening

students' AI literacy can mitigate external influences and make ChatGPT more appealing, thus facilitating smoother technology adoption. Consequently, AI literacy stands as a crucial factor influencing students' approach to technology transition.

Hypothesis 5: AI literacy will reduce the impact of switching costs on the intention to transition to ChatGPT.

3. Research Methods

3.1 Research model

Based on the inferences drawn from the research hypotheses, this study proposes the following research framework. The variables include relationship inertia, system quality, information quality, switching costs, AI literacy, and transition intention. The research framework is illustrated in Figure 1.

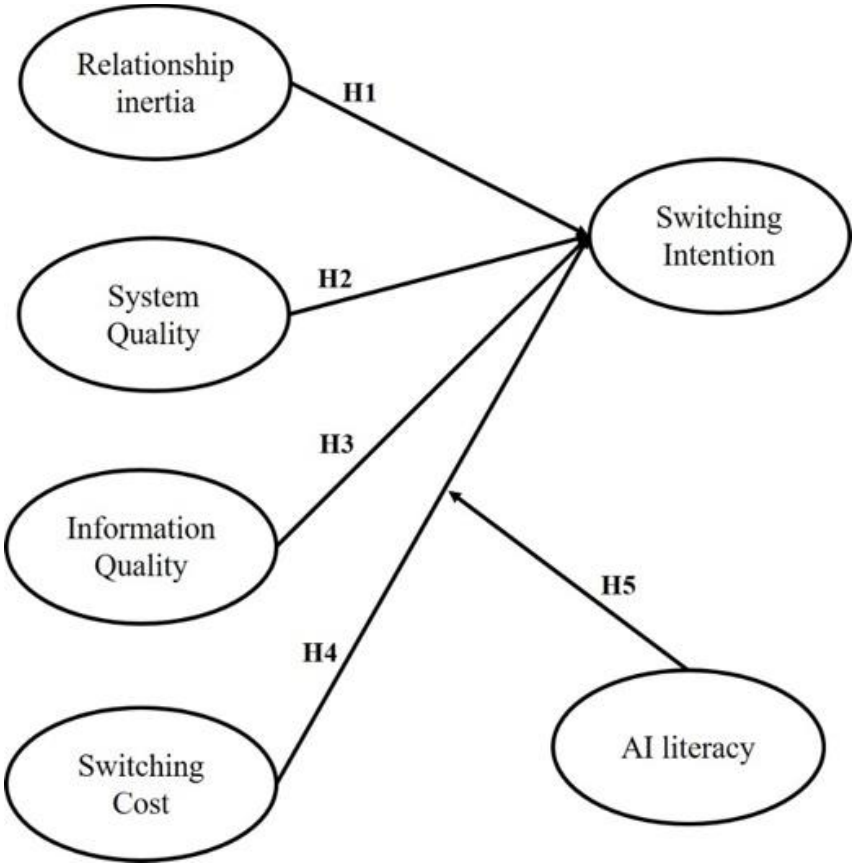

Figure 1 Research Methods

3.2 Questionnaire design

The questionnaire design for this study is based on previous research, incorporating six main concepts: AI literacy, switching costs, relationship inertia, system quality, information quality, and switching intention. Specifically, the **Switching Costs (SC)** scale includes 3 items derived from Chen & Keng (2019), and the **Switching Intention (SI)** scale also consists of 3 items from the same study. The **AI literacy** items are adapted from Chen et al. (2024), with a total of 6 items after modifications. **Relationship inertia** is based on the items from Chen & Keng (2019), with 4 modified items included in the questionnaire. Lastly, the **system quality** and **information quality** items are taken from DeLone & McLean's (2003) scales, with 3 and 6 items, respectively.

All variables are measured using a 5-point Likert scale. To avoid measurement bias, three university professors were invited to assist in the design of the questionnaire's wording. Additionally, to prevent translation errors, a professional with a foreign language background helped translate the questionnaire into English to ensure consistency in the wording.

The questionnaire will be distributed to students at a high school in Kaohsiung, with the survey scheduled to be conducted in mid-April 2024.

4. Expected Research Result

This study anticipates that high school students' transition from traditional search engines to ChatGPT for course learning will be influenced by various push, pull, and mooring factors identified through the Push-Pull-Mooring (PPM) model, specifically expecting that the habitual use of traditional search engines (relationship inertia) may act as a significant barrier to adopting new technologies like ChatGPT; however, as students' learning needs evolve, this inertia may weaken, prompting students to explore more efficient tools such as ChatGPT, while the perception of ChatGPT's system quality and information quality will positively influence students' intention to transition, with ChatGPT's efficiency in providing accurate and relevant information expected to attract students, making it a favorable alternative to traditional search engines; furthermore, the switching costs, including the time and effort required to learn and use ChatGPT, may negatively impact students' willingness to transition, yet if students perceive the benefits of using ChatGPT as outweighing these costs, they are more likely to adopt the new technology, and AI literacy is expected to reduce the negative impact of switching costs on students' intention to transition, as students with higher AI literacy will likely have more confidence in using ChatGPT, making the transition smoother and more appealing, and we anticipate conducting the survey in mid-10 2024 after students return to school, planning to collaborate with class teachers to assist in uniformly distributing the questionnaires across classes to ensure a more systematic and reasonable collection of responses, with the findings from this study expected to provide valuable insights into the factors influencing high school students' transition to AI-based learning tools, offering recommendations for effectively integrating ChatGPT and similar technologies into educational practices.

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