

A Conceptualized Framework of University Students' Perceptions of ChatGPT as a Tool for Learning and Research

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Abstract

The swift progressions in artificial intelligence (AI) have resulted in the emergence of ChatGPT, a large language model (LLM) with capabilities in natural language processing. As ChatGPT garners widespread attention, it is imperative to comprehend the factors influencing its adoption in education. Guided by the Procedure for Conceptual Framework Analysis (PCFA), a systematic literature review approach, this research examines scholarly work published from 2020-2024 on the adoption of ChatGPT in education. The research examines students' perceptions about ChatGPT and how these perceptions impact their adoption of ChatGPT for academic purposes. Five categories of factors emerged from these study findings, which included Technological factors – usability, accessibility, availability, affordability and reliability of the ChatGPT technology. The revised literature also identified Institutional factors – organizational culture, leadership support, resource availability and policy framework. In addition are Human factors – technical skills, experience, training, attitude, motivation, trust and familiarity with technology. Ecological – economic conditions, societal norms and environmental sustainability as well as Cognitive – perceived usefulness, perceived ease of use, self-efficacy, curiosity, fear and awareness also emerged. These results inform how students perceive ChatGPT as a tool for performing education activities, enhance comprehension of student interaction with AI-driven educational tools and guide educational strategies that exploit the capabilities of ChatGPT. This article enriches the dialogue by presenting a thorough conceptualization of the factors impacting ChatGPT adoption and informs future studies on the ethical integration of AI tools in education and provides valuable insights for educational policymakers, administrators, and scholars on how to integrate ChatGPT in education activities.

Keywords: ChatGPT, Artificial Intelligence, Education

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Introduction

The proliferation of artificial intelligence (AI) technologies has had a significant impact on various sectors, including the field of education. The latest and most notable AI-powered tool is ChatGPT, a sophisticated language model created by OpenAI (2022). ChatGPT has showcased impressive capabilities in natural language processing, allowing it to engage in fluid conversations, respond to inquiries, and aid in a variety of tasks such as writing, analysis, and problem-solving (Weng, 2023).

The emergence of ChatGPT as a tool with the potential to revolutionize educational practices has generated both excitement and apprehension within the realms of educators and policymakers (Brynjolfsson, et al., 2023). While ChatGPT can be utilized to enrich learning experiences, offer personalized support, and cultivate critical thinking and innovation (Metz, 2023). It also brings forth concerns regarding academic honesty, the risk of unethical behaviour, and the evolving landscape of teaching and evaluation (Strickland, 2023).

While this article acknowledges the existence of research on the subject of ChatGPT in education, there is limited research that presents a conceptualized framework of factors influencing the adoption of ChatGPT as a tool for teaching, learning and research. This is contrary to the fact that university students represent a significant demography of ChatGPT users. It is on this background that it became essential to comprehend students' perceptions and factors influencing the integration of ChatGPT into their learning and research practices.

Understanding the students' perceptions and the factors influencing the acceptance of ChatGPT in educational environments is vital for formulating effective approaches and regulations that capitalize on the advantages while addressing the obstacles. To meet this necessity, the objective of this research is to construct a conceptual framework that identifies and amalgamates the principal perspectives of students towards the adoption of ChatGPT in educational contexts. For this purpose, the study advances the academic work by Dube et al., (2024) who through a systematic literature review, presented students' perceptions about the benefits and challenges of using ChatGPT in teaching, learning and research.

The conceptual framework of factors influencing the adoption of ChatGPT as a tool for learning and research is grounded in a systematic literature review using the Procedure for Conceptual Framework Analysis (PCFA) (Jabareen, 2009), which enables a comprehensive examination of the existing research on technology adoption in education and the unique characteristics of ChatGPT.

Methodology

This study utilizes the Procedure for Conceptual Framework Analysis (PCFA) to methodically examine and combine the current literature on the factors that affect the adoption of ChatGPT in education. The PCFA method consists of the following steps:

Mapping the selected data sources: The researchers performed an extensive search of pertinent databases, such as Scopus, Web of Science, and Google Scholar, to locate academic publications, conference proceedings, and reports published from 2020 to 2024. The search queries were various combinations of keywords, including "ChatGPT," "artificial intelligence," "education," "adoption," and "technology acceptance.". the final search of literature yielded a count of 45 articles for inclusion in study.

Extensive reading and categorizing of the selected data: The researchers conducted a comprehensive analysis of the chosen literature to identify and classify the fundamental ideas, themes, and aspects associated with the use of ChatGPT in educational environments. The researchers consolidated the fundamental ideas and patterns that arose from the literature analysis and gave suitable labels to describe the elements that impact the adoption of ChatGPT in education.

Deconstructing and categorizing the concepts: The ideas that were found were analysed and divided into wider categories, including technical, organizational, individual, and contextual variables. The researchers used the classified concepts to create a conceptual framework that clearly illustrates the connections between the main factors influencing the adoption of ChatGPT in education.

Validating the conceptual framework: The conceptual framework was verified by engaging in expert consultations and conversations with educators, policymakers, and academics in the field of educational technology.

Results

The PCFA approach yields a conceptual framework comprising five primary components: technological, institutional, human, ecological and cognitive factors, which are all illustrated in Table 1.

Table1. Factors Influencing Student Perceptions and Adoption of ChatGPT

Main factor	Sub-factors	Citation
Factors related to technology	Learning (benefits	(Rahim et al., 2023)
	Research:	(Chan & Hu, 2023)
	Affordability	(Dube, 2020)
	Availability	(Jowarder, 2023)
	Accessibility	(Dube, 2020)
	Usability	(Abouammoh et al., 2023), (Hasanein & Sobaih, 2023), (Silvano & Gui, 2024)
	Social Influence (SI)	(Filipec & Woithe, 2023)
	Anxiety levels	(Zhang & Wang, 2022; Wu & Liu, 2024)
	Resource availability)	(Dube, 2020)
	Policies	(Dube, 2020)
	Training	(Dube et al., 2023)
Ecological Factors	Facilitating Conditions (FC)	(Shaengchart, 2023), (Sabeh, 2024), (Alshammari et al., 2024)
	Environmental sustainability	(Elkhodr et al., 2023), (Bin-Nashwan et al., 2023)
Factors related to human characteristics	Attitude towards technology	(Shaengchart, 2023), (Bin-Nashwan et al.,

Main factor	Sub-factors	Citation
		2023), (Dube, 2020)
	Habit	(Gulati, Saini, Singh & Kumar, 2024), (Biloš, 2024)
	Experience	(Chan & Hu, 2023), (García-Alonso, et al., 2024)
	Motivation	(Muñoz et al., 2023), (Dube, Mutunhu, ; Dube, 2023)
	Awareness	(Mutunhu, et al., 2022)
	Trust	(Silvano, Gui, 2024), (Currie et al., 2023), (Al-shorbagy & Hallit, 2024)
	Self-efficacy	(Sabeh, 2024)
	Fear	(Bin-Nashwan et al., 2023)
	Perceived Usefulness (PU):	(Jowarder, 2023),
	Perceived Ease of Use	(Alshurideh et al., 2024), (Liu & Liu, 2023)
	Curiosity	(Sinaga et al., 2024), (Chatgpt, 2024)

The contents of Table 1 depict the general perceptions of students regarding the adoption of ChatGPT as a tool for learning and research. The identified factors depict both the enabling and inhibiting factors for adopting ChatGPT in education. For example, it is evident in the reviewed literature that the positive perceptions of students are derived from such factors relating to technology, institution, humans, ecology and cognitive factors. While much of these factors facilitate, there are also factors that inhibit the adoption of ChatGPT as a tool for learning and research.

Factors Related to Technology

This component pertains to the technological aspects and functionalities of ChatGPT that impact the way university students perceive and utilize the tool. Prior research indicates that elements such as the language processing capabilities, ease of use, and general usefulness of the tool have a substantial impact on students' opinions.

- **Usability.** It has been shown in literature that students develop a positive perception of technology that is usable and adds value to students' learning and research practices. like ChatGPT is usable and students gain value from using it, it becomes imperative for students to have a positive. (LMS) (Dube, 2020; Dube & Scott, 2016a), information and communication technologies (ICT) enabled learning (Dube & Scott, 2017, Dube, 2017) as well as virtual and augmented reality technologies (Maphosa, Mutunhu Ndlovu & Dube, 2023).

- **Accessibility.** Existing literature proves this importance. For example, Cuban et al. (2001) argues that high access to technology is important for students to have a positive perception towards such technologies as ChatGPT. Similarly, an article published later revealed that access precedes use of any technology (Racherla & Mandviwalla, 2013), a sentiment confirmed by recent studies (Dube, 2020).
- **Affordability.** This is an important factor because the cost of technology could either enable or inhibit the adoption of a technology. This observation is confirmed in a study by Al-Kumaim et al., (2021), who argues that a lack of affordability to technology impacts negatively the adoption of technology.
- **Availability.** Existing studies depict availability as a major factor that determines if a technology is adopted or not (Bringula, 2013; Riddlesden & Singleton, 2014; Dube & Scott, 2016b).
- **Reliability.** Existing literatures has shown that reliable technologies are likely to be adopted more than unstable and unreliably technologies (Njaya & Murangwa, 2017; Cui et al., 2021).

Factors Related to Cognition

The cognitive factors focus on how individuals think about and process information related to the technology. This includes perceived usefulness, perceived ease of use, Awareness, Self-efficacy, curiosity and fear.

- **Perceived benefits for learning (PU):** The research emphasizes the capacity of technology to improve research efficiency, facilitate content development for assignments, and provide tailored learning experiences (Zhang & Wang, 2022).
- **Perceived Ease of Use:** Research indicates that the ease of use has a substantial influence on how likely students are to accept a certain product or service (Wu & Liu, 2024). An intuitive user interface and easily accessible lessons are essential for cultivating favourable dispositions towards ChatGPT (Liu, 2023).
- **Self-efficacy.** This is an important factor that influences the adoption of technology that promotes AI supported teaching, learning and research (Dolighan & Owen, 2021; Baroudi & Shaya, 2022).
- **Curiosity.** This is a major factor that can determine if the students would adopt new technologies like ChatGPT. This observation is confirmed in literature, which shows that curious students always try out and adopt technology without any hesitation (Bailey et al., 2021).
- **Fear.** Literature provides evidence that if a technology is perceived as risky, the intended users would shun it because of fear (Juutinen et al., 2011; Tyagi, 2012).

Institutional Factors

The organizational environment encompasses the set of rules, procedures, and support systems inside academic institutions that influence and shape students' utilization of ChatGPT. Prior research has emphasized the significance of institutional rules, academic integrity regulations, and the relationship between instructors and students in relation to this matter; (Mutunhu, et al., 2022; Dube & Scott, 2018).

- **Organizational culture** is closely linked to the adoption of technology such that an absence of such culture will result in the non-adoption of technology (Shahzad et al., 2017).
- **Resource availability.** Access to the right technological resources is essential for the adoption of technology (Dube & Scott, 2018).
- **Leadership support.** A lack of this factor will prevent students from adopting technology (Orlov et al., 2021).
- **Policy framework.** Good policies promote the usage of technology (Dube, 2020).

Ecological Factors

The environmental aspects refer to the wider sociological, technical, and cultural elements that might impact how university students perceive and utilize ChatGPT. These aspects encompass the level of acceptance and knowledge of AI technologies, ethical concerns, and the changing role of technology in education.

- **Facilitating Conditions (FC):** Adoption rates can be influenced by the presence of training workshops, technical assistance, and institutional regulations related to the usage of AI.
- **Societal norms.** The societal norms can be delimiters to the adoption of technology. If a society despises technology, then its adoption can be hindered whereas if the norms are supportive then the technology would be adopted (Dube, 2020; (Hardaker & Singh, 2011).
- **Environmental sustainability.** An unstable environment does not promote the adoption of technology (Omotayo & Tihamiyu, 2017).

Factors Regarding Human Characteristics

This component focuses on the individuals using the technology, including their skills, experience, and perceptions.

- **Technical skills.** Skilled users do not hesitate to adopt any technology that adds value to their practice (Rudhumbu, 2020).
- **Experience.** This is a major factor that influences the adoption of any technology (Kovacs et al., 2021; Cruickshank et al., 2021).
- **Training.** It is imperative for users of technology to acquire knowledge of how to use technology. Without the technical know-how, intended users find it difficult to operate technology to achieve their objectives.
- **Attitude.** Negative attitude hinders while positive attitude promotes the uptake of a technology (Liu, 2023).
- **Motivation.** Highly motivated students tend to adopt technology quicker than those who not motivated (Muñoz et al., 2023).
- **Trust and familiarity.** Trustworthiness of an AI generated assignment or project is the most important reason for adopting a technology (Trust & Whalen, 2023).
- **Familiarity with technology.** Like trust, familiarity with technology plays an important role in the adoption of technology (Byungura et al., 2018; Lapitan et al., 2021).

Conceptual Framework

Based on the findings, a conceptual framework is proposed that integrates the TOE framework with the identified themes (Figure 1). The framework depicts how students' perceived benefits, drawbacks, and anxieties regarding ChatGPT, alongside the influence of the university environment, impact their intention to use it for learning and research.

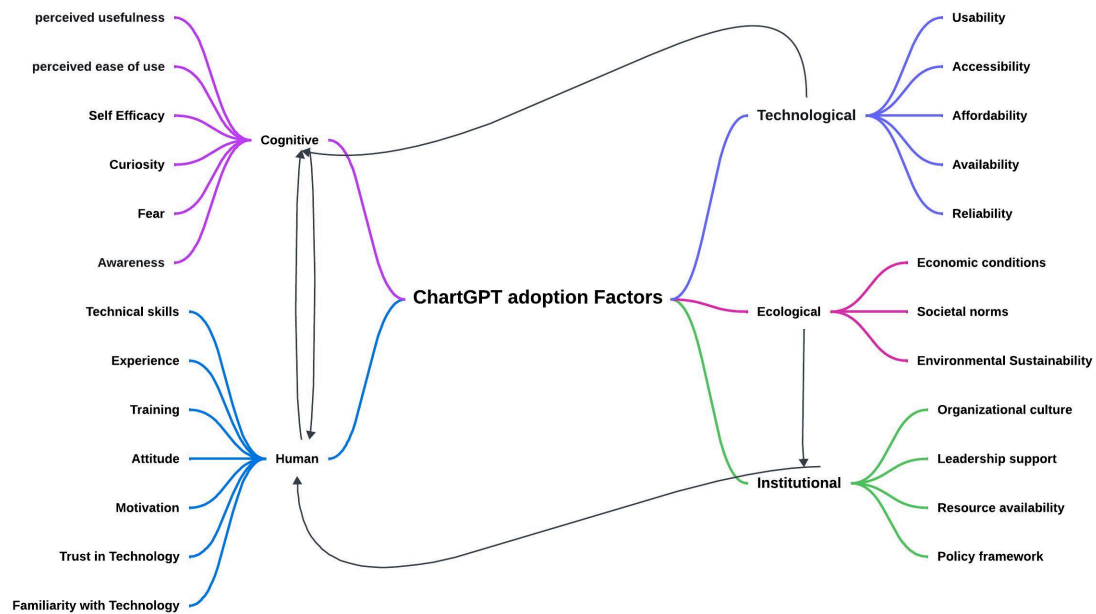


Figure 1: A Conceptual Framework of ChatGPT Adoption Factors

Discussion

This research makes a valuable contribution to the comprehension of university students' perspectives on ChatGPT as a tool for learning and research. The results underscore the potential advantages that students identify in relation to increased efficiency, acquisition of knowledge, and support for research. Nevertheless, issues regarding plagiarism, bias in information, and dependence on AI for critical thinking necessitate thorough examination.

Educational strategies that provide students with the ability to assess AI-generated content critically and employ ChatGPT responsibly are crucial. Academic institutions can organize sessions on information literacy and ethical AI usage to tackle student concerns and encourage the informed integration of ChatGPT into scholarly activities.

The suggested theoretical framework offers a thorough insight into the diverse factors that impact the acceptance of ChatGPT in academia. This framework enhances the current body of knowledge on technology adoption in education by encompassing the distinct features and obstacles linked to the incorporation of advanced language models such as ChatGPT.

This research contributes to the understanding of university students' perceptions of ChatGPT as a learning and research tool. The findings highlight the potential benefits students perceive in terms of enhanced efficiency, knowledge acquisition, and research support. However, concerns about plagiarism, information bias, and reliance on AI for critical thinking require careful consideration.

Educational methods that equip students with the skills to critically assess AI-generated information and use ChatGPT responsibly are imperative. Higher education institutions can play a pivotal role by organizing:

Training workshops: Providing students with the skills to critically evaluate AI-generated information and use ChatGPT responsibly. Technical support: Ensuring that students have the necessary technical assistance to address any challenges encountered while utilizing ChatGPT.

Implications

The implications of this study are far-reaching for educational policymakers, administrators, and researchers. The conceptual framework can serve as a guiding tool for the strategic planning and implementation of ChatGPT in educational institutions. It can provide valuable insights for the creation of regulations, teacher training programs, and support systems to enable the appropriate and efficient integration of ChatGPT, while also tackling the related issues and concerns.

Limitations and Future Research

Conducting a study on faculty perspectives about ChatGPT and its possible influence on teaching methodologies may yield significant insights. Subsequent research endeavours may enhance the credibility and enhance the conceptual framework by conducting empirical inquiries, such as case studies, surveys, and longitudinal analyses, to examine the implementation of ChatGPT in various educational settings. Furthermore, investigating the interaction between the highlighted characteristics and their respective significance in various educational environments will enhance our overall comprehension of the aspects that impact the adoption of ChatGPT in education.

Conclusion

This study introduces a conceptual framework that identifies and combines the main aspects that affect the acceptance of ChatGPT in educational environments. The framework includes technical, organizational, individual, and contextual aspects, emphasizing the intricate and diverse character of this phenomena. The results of this study offer important knowledge for educational policymakers, administrators, and researchers in effectively managing the difficulties and advantages associated with the use of ChatGPT in educational settings. Educational institutions may design effective plans and policies to utilize the potential of ChatGPT while minimizing the dangers and concerns by addressing the mentioned aspects. ChatGPT holds the capacity to serve as a beneficial instrument for university students. Nevertheless, the effective implementation of this needs the direct resolution of student worries and concerns.

By cultivating a discerning and accountable attitude towards AI-driven technologies, educators This study presents a conceptual framework for comprehending the way university students perceive ChatGPT as a tool for learning and research. The results indicate that students generally have a positive perception towards ChatGPT as a tool for learning and research. The reviewed literature shows that students view ChatGPT as a valuable and user-friendly tool, while also acknowledging the importance of striking a balance between its advantages and any difficulties and restrictions. It is imperative to deal with inhibiting factors

to enable an increased adoption of ChatGPT in education. The findings derived from this research can provide valuable input for the formulation of guidelines and regulations pertaining to the suitable and ethical utilization of AI-driven technologies in academic environments.

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