

An empirical study on the relationship between generative artificial intelligence and analytical skill development: The mediating role of knowledge sharing

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ABSTRACT

The adoption of generative artificial intelligence (GenAI) in education sparks a great deal of controversy with both supportive and negative arguments from scholars. This study aims to explore the role of GenAI application and knowledge sharing on the analytical skills of university students. Partial least squares structural equation modelling (PLS-SEM) was used to analyse data from 295 Chinese university students who are studying service management programs, such as hospitality, tourism and sports-related programs. Results suggest that students are highly receptive to using GenAI in their learning, and leveraging GenAI can positively affect students' analytical skills through knowledge sharing. Both perceived usefulness and perceived ease of use have significant positive effects on GenAI application, GenAI application positively predicts both knowledge sharing and analytical skills. This study provides empirically grounded evidence elucidating the role of GenAI in enhancing students' analytical capabilities. It contributes to a more nuanced understanding of this emerging technology's implications in knowledge management. It also informs policy-makers in higher education institutions that investment in GenAI into educational systems are necessary for future talent cultivation.

INTRODUCTION

In recent years, generative artificial intelligence (GenAI) tools, such as ChatGPT, have revolutionised people's learning methods (Gouseti et al., 2025; Lang et al., 2025). GenAI can answer questions quickly and generate the content that people need. This emerging technology is overcoming barriers to knowledge acquisition and fundamentally changing the landscape of

education (Abdul Rahman et al., 2025; Andrae, 2025; Nazeer et al., 2026). Numerous students and lecturers apply GenAI for learning and teaching, enabling the combination of GenAI and digitalised pedagogy in education (Law, 2024; Tuo et al., 2025). Against the backdrop of higher education in China, local models such as Wenxin Yiyan and DeepSeek are being widely used by college students for academic research and information retrieval (Huang et al., 2025; Li et al., 2025; Gong et al., 2025). Therefore, fully understanding the impacts of GenAI applications on users holds crucial practical significance. Existing research has confirmed that when GenAI participates in the learning process as an auxiliary tool, it can effectively improve learning efficiency and bring users a more diverse and enriched learning experience (Darban, 2025; Jia et al., 2025). However, it is crucial to remain vigilant that excessive dependence on GenAI may give rise to a series of adverse consequences. Specifically, it not only exerts a negative impact on users' academic performance (Xu et al., 2025), but also tends to undermine their core cognitive capabilities, and the degradation of creativity and critical thinking stands out as a particularly prominent manifestation of this decline (Lo et al., 2024; Vieriu & Petrea, 2025).

Critical thinking skills and knowledge management are essential for university students. Learning and teaching are typical knowledge sharing and transferring processes that improve students' learning outcomes; for example, effective knowledge sharing can enhance students' critical thinking skills (Yeh, 2012). Knowledge sharing in the education field refers to the interchange of useful ideas, data and experiences among individuals working on learning tasks, such as group discussions, team projects or strategic evaluation (Duong et al., 2023). The emergence of GenAI is altering people's and organisations' knowledge management (Nazeer et al., 2025; Sumbal et al., 2024). Furthermore, previous studies have indicated that ChatGPT can help students absorb knowledge in the course of their studies (Nazeer et al., 2025; Milakis et al., 2025). Critical thinking skills include interpretation, analysis, evaluation, inference, explanation and self-regulation (Facione, 1990). Analytical skills, such as one type of critical thinking skills, involve understanding problems, identifying causes and analysing the persuasiveness of arguments (Tang et al., 2024). This higher-order thinking plays an important role in decision-making and problem-solving (Jannah et al., 2026). However, the effects of GenAI application on students' critical thinking skills remain debatable. For example, on the one hand, Essel et al. (2024) argue that the critical thinking skills of students who had used ChatGPT in their courses were better than those who did not. On the other hand, some scholars argue that GenAI, which is trained on large data sets, may propagate stereotypes and generate distorted information that may impede students' critical thinking skills (Melisa et al., 2025). The widespread use of GenAI technology may negatively affect university students' ability to share knowledge and think critically (Essien et al., 2024). Therefore, what is the relationship between GenAI application and critical thinking skills remains controversial.

The usage and influence of ChatGPT in the service industry education have attracted intense attention from scholars and practitioners (Chon & Hao, 2025; Ray, 2024). Existing studies argued that GenAI represented by ChatGPT is comprehensively reshaping the curriculum system, teaching practices, and talent cultivation logic of service industry education, including hospitality, tourism and sports-related programs. The students majoring in this discipline exhibit distinct professional characteristics in terms of their usage behavior of GenAI, learning adaptability, and ability development paths (Zhang et al., 2024). Existing research remains limited in understanding the transition from traditional AI to generative AI. Empirical investigations into the implementation of GenAI in education for service industries are still insufficient (Fouad et al.,

2026). In addition, research on the impacts of GenAI on students' knowledge sharing and analytical skills is relatively scarce, especially in service industry, therefore, this study adopts an empirical research design to systematically explore the internal relationships among the application of GenAI, knowledge sharing, and students' analytical skills in a service education context.

This study provides important insights into the theoretical development of knowledge management and critical thinking by including a revised technology acceptance model (TAM). First, it supports the assumption that leveraging GenAI in learning and teaching can enhance students' knowledge-sharing behaviour and ultimately improve their analytical skills. Second, this study examined a wide range of GenAI tools in China, extending the TAM theory in the context of GenAI. Third, as far as is known, this is one of the first quantitative studies regarding GenAI and learning outcomes in the field of service-related programs education (To & Yu, 2025; Zhu & Yu, 2025), deepening our understanding of the social constructivist theory and social exchange theory in the AI context. Finally, the findings of this study offer a new understanding on cultivating analytical skills and developing pedagogies based on GenAI tools that affect the future of service education.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Theoretical Foundation

Social constructivist theory emphasises collaborative engagement between individuals in acquiring new knowledge, with the More Knowledgeable Other (MKO) and Zone of Proximal Development (ZPD) as its two core operational pillars. (Vygotsky, 1986), and the application of new technology facilitates learners' engagement in the collaborative knowledge construction process (Wang et al., 2009). In recent research, Tran et al. (2025) empirically demonstrated that GenAI provides personalized scaffolding for learning and fully assumes the role of MKO within the framework of social constructivism, thereby reshaping the internal operational mechanisms of this theory in the digital age.

The TAM contends that people will use an emerging technique if the technique is useful and easy to use (Davis, 1989). As an emerging technique, GenAI has offered a new way for people to learn in terms of knowledge acquisition. Students will adopt GenAI if they perceive the application of GenAI as convenient to use and beneficial. For example, Shahzad et al. (2024) revealed that the perceived ease of use, usefulness and intelligence of ChatGPT play a mediating role in affecting the relationship between ChatGPT awareness and the intention to adopt ChatGPT among students.

The interconnection of AI and knowledge sharing offers opportunities for people to exchange knowledge reciprocally based on social exchange theory (Olan et al., 2022; Zhong & Wang, 2025). The application of AI supports tacit knowledge sharing through socialisation and explicit knowledge sharing through externalisation (Akrofi, 2023; Olan et al., 2022). From the perspective of social exchange, the dual nature of AI technology as both a high-value practical tool and a controversial emerging technology makes individuals weigh the potential social rewards and costs when deciding whether to share AI-related knowledge, which further shapes their knowledge

sharing behaviours (Zhong & Wang, 2025). Moreover, the application of GenAI enables students to justify and analyse the content generated by GenAI critically (Chiu, 2024). Critical thinking is a set of socially constructed processes in which people develop their cognitive framework through social exchange (Wass et al., 2011). With the help of GenAI, students can share and construct their knowledge effectively (Nazeer et al., 2025) to reshape and refine their cognitive systems.

The combination of GenAI and knowledge sharing offers a mechanism to link social constructivist theory, social exchange theory and TAM to explore the revolution of education in an intellectualised and digitalised context. Thus, in this study, we propose that the application of knowledge management tools, such as GenAI, facilitates knowledge sharing; meanwhile, students interact and collaborate to construct their knowledge when they share knowledge with others and ultimately improve their analytical skills.

Research Model

The TAM is based on the reasoned action model, assuming that whether people adopt a new technology depends on the usefulness and ease of use of the technology (Davis, 1989). Various studies in educational research have applied the TAM to examine the impacts of leveraging innovative technology in higher education. For example, Gül and Ateş (2023) argued that science, technology, engineering and maths training could improve the TAM fit, indicating that such training positively influenced lecturers' perceived ease of use and usefulness, attitude and intention to use technology-based education. Scherer et al. (2019) conducted a meta-analysis to examine the factors of the TAM that could affect lecturers' technology application in teaching. They found that perceived ease of use and usefulness positively affected attitudes towards new technology, and attitudes towards technology positively affected technology use.

GenAI is powerful at generating content and providing information to users because it has been trained on substantial amounts of data. It is a widely accepted belief that the adoption of GenAI, such as ChatGPT, can enhance people's working efficiency (Le et al., 2026). Moreover, it is helpful for students to manage their tasks, including retrieval of learning materials, dissertation outline creation and assignments (H. Chang et al., 2025). Furthermore, GenAI offers an effort-free platform for users to use and interact. Thus, we can suggest that students would like to use GenAI tools if they believe GenAI is beneficial and convenient to use (Baharuddin et al., 2024; Shahzad et al., 2024). The traditional view of the TAM is that perceived usefulness and ease of use affect the actual use of technology through attitudes and behavioural intention towards using it. However, whether the perceived usefulness and ease of GenAI use directly affect the application of GenAI remains unknown; thus, we hypothesise the following.

H1: A positive relationship exists between the perceived usefulness of GenAI and the application of GenAI.

H2: A positive relationship exists between the perceived ease of use of GenAI and the application of GenAI.

Ideal critical thinkers are 'constructivist knowers' who can obtain knowledge by integrating objective and subjective ways of knowing (Menssen, 1993). Learning can be fostered in an interactive environment where learners and instructors discuss, negotiate and share (Edwards,

2011). Based on social exchange theory, knowledge sharing always occurs in interactive environments in which students actively exchange knowledge for mutual benefits at low cost (Zhang et al., 2018), for example, when participating in interactions in class and working on group assignments to get higher grades. Several studies have examined the intersectionality of technologies and knowledge sharing and revealed that interaction between AI and knowledge sharing affords a chain of reciprocity between the people who participate in the exchange relationship (Olan et al., 2022). Zhong and Wang (2025) revealed that the perceived usefulness of AI technologies is the core psychological trigger for individuals' AI-related knowledge sharing behaviour, and this effect is driven by the expectation of positive social feedback from knowledge recipients, which aligns perfectly with the core logic of social exchange theory.

As a new generation of AI, the emergence of GenAI has become an extension of the development of students' collective learning (Duong et al., 2023). The adoption of knowledge management technology (Liu et al., 2023), such as GenAI tools (Pletsch et al., 2026), can promote knowledge sharing and help students assimilate knowledge (Nazeer et al., 2025). However, other scholars proposed different ideas regarding the role of knowledge sharing in the application of GenAI, for example, Ngo et al. (2024) argued that knowledge sharing affects GenAI (ChatGPT) adoption through user satisfaction. Duong et al. (2023) claimed that knowledge sharing moderates the relationship between the intention to use ChatGPT and the actual adoption of ChatGPT. Thus, the role of knowledge sharing in the application of GenAI remains unclear. In this study, we argue that the application of GenAI facilitates students' knowledge-sharing behaviour because, first, GenAI can offer students new knowledge; second, GenAI can provide customised knowledge for students, which improves their learning efficiency and enables the rapid spread of knowledge; third, based on social exchange theory, the intersectionality between knowledge sharing and technology (e.g. GenAI) forms new relationships that promote understanding of people's expertise, strengthening their willingness to engage in knowledge exchange (Olan et al., 2022 ; Zhong & Wang, 2025). Therefore, we hypothesise the following:

H3: A positive relationship exists between the application of GenAI and knowledge sharing.

With the rapid development of the internet, especially the emergence of online social media, such as Facebook, Twitter and TikTok, people are constantly surrounded by a large amount of data and information. Such social media platforms make accessibility to information easy; however, if people lack critical thinking skills, particularly analytical skills, it is difficult to find the truth among various outlets disseminating facts or misinformation (Pennycook & Rand, 2020). As a fundamental component of critical thinking skills, analytical skills revolve around comprehending problems, pinpointing their underlying causes and scrutinising the compelling nature of arguments (Tang et al., 2024). Knowledge sharing interacts with critical thinking (W.-L. Chang & Yeh, 2021) and positively affects it (Yeh, 2012). Students tend to actively acquire, share and create knowledge through analysis and evaluation to enhance their critical thinking skills (Yeh, 2012). This is because they can acquire knowledge about analysing problems through sharing knowledge with their peers. In this process of constructivism, students accumulate their knowledge via social interaction with their peers in the form of knowledge sharing; consequently, students' analytical skills can be enhanced. Therefore, we hypothesise the following.

H4: A positive relationship exists between knowledge sharing and analytical skills.

It is vital to cultivate students' critical reasoning and thinking skills when incorporating GenAI for their learning (Juan et al., 2026), such as ChatGPT, into the education system (Chiu, 2024). Despite GenAI being powerful in text generation, it is still possible to output misinformation. Therefore, students need to learn how to critically analyse and evaluate the information offered by GenAI when they use GenAI for learning (Chiu, 2024). Dalgıç et al (2024) found that the features of ChatGPT for learning, such as optimising learning processes, problem-solving and reasoning, natural language processing and virtual learning experiences, all positively influenced learning outcomes, such as critical thinking and self-learning skills, through digital literacy. Furthermore, applying ChatGPT to accomplish in-class tasks can effectively enhance students' critical thinking skills (Essel et al., 2024). Dialogues with ChatGPT enable students to think critically to justify and analyse the content supplied by ChatGPT; therefore, students' critical thinking skills, especially analytical skills, are improved. Therefore, we hypothesise the following.

H5: A positive relationship exists between the application of GenAI and analytical skills.

The research model is shown in Figure 1.

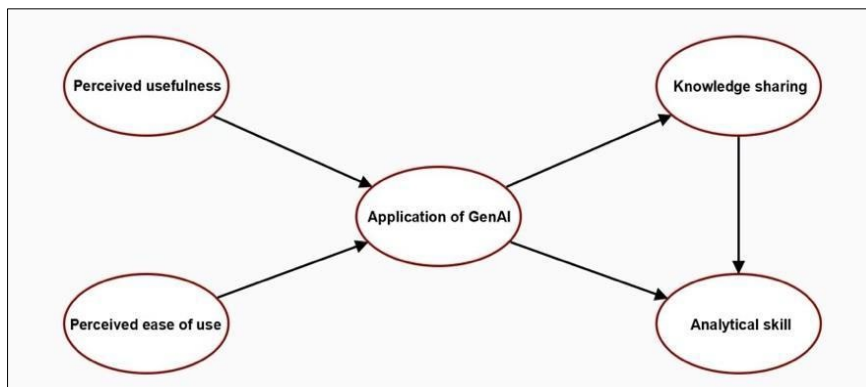


Figure 1: Research Model

RESEARCH METHOD

Sample and Data Collection

This research used a non-probability convenience sampling approach to collect data from Chinese university students majoring in service industry-related programs, such as hospitality, leisure, and tourism. The core training objectives of the service industry-related programs require students to possess the ability to analyze and make decisions in complex situations involving multiple stakeholders. GenAI has brought important opportunities to the service industry in various aspects such as operations, design, marketing, destination management, human resources, revenue management, accounting and finance, and strategic management (To & Yu, 2025). These unique professional requirements appeal for the examination necessity on the role of GenAI in affecting students' analytical skills (Dogru et al., 2025) . A

purposive snow-balling sampling method was chosen because target respondents are university students who are studying service industry-related programs, such as hospitality, leisure, tourism. An online questionnaire was distributed via various channels, including social media platforms (WeChat and QQ), class chat groups and student clubs, to maximise the reach of the survey and respondents were also encouraged to share the questionnaire with their classmates. During the two-week data collection period, a total of 322 responses were received from thirty universities in mainland China, such as Sichuan University, Guangdong University of Finance and Economics, etc. in fifteen provincial administrative regions. After eliminating incomplete questionnaires, 295 valid responses were retained for data analysis. The respondents' detailed profiles can be found in Table 1.

Table 1: Respondents' Profiles

Gender (n = 295)	n	%
Female	219	73.74
Male	78	26.26%
Age (n = 295)		
18–20	179	60.27%
21–22	96	32.32%
Above 22	22	7.41%
Grade (n = 295)		
Freshman	15	5.05%
Sophomore	108	36.36%
Junior	117	39.39%
Senior	43	14.48%
Postgraduate	14	4.72%
Major (n = 295)		
Hospitality management	16	5.39%
Tourism management	275	92.59%
Leisure management	3	1.01%
Sports	3	1.01%
Location (n = 295)		
Guangdong	98	33.22%
Chongqing	70	23.73%
Sichuan	47	15.93%
Tibet	23	7.80%
Guizhou	18	6.10%
Hainan	14	4.75%
Others	25	8.47%

Measurements

In our study, all constructs were modified and adopted based on scales developed in previous well-established research. Table 2 displays all detailed measures. In particular, the Perceived ease of GenAI use and Perceived usefulness of GenAI were measured by revising the measurement by Davis (1989) and The application of GenAI was revising the measurement by scholars Vijayasarathy (2004) and Duong et al. (2023). The construct of Knowledge sharing was adopted based on the work of Chhim et al. (2017). The Critical Thinking Disposition Inventory–Chinese Version (CTDI–CV) (Peng et al., 2004) was used to measure students' Analytical skills. This is widely used to examine Chinese students' critical thinking skills, for example, Huang et al. (2021)

It should be noted that, in the questionnaire, besides ChatGPT, we also listed other GenAI tools widely used in domestic Chinese, for example, ERNIE Bot and TIMI.

Table 2: Specific Measures

Items
Perceived usefulness of GenAI (Davis, 1989)
PERUSE1. Using GenAI would enable me to accomplish tasks more quickly.
PERUSE2. Using GenAI would improve my assignment performance.
PERUSE3. Using GenAI would make it easier for me to do my assignment.
Perceived ease of GenAI use (Davis, 1989)
PEREASE 1. It would be easy for me to become skilful at using GenAI.
PEREASE 2. Learning to operate GenAI would be easy for me.
PEREASE 3. My interaction with GenAI would be clear and understandable.
Application of GenAI (Vijayasarathy, 2004; Duong et al., 2023)
INTAPP 1. I use GenAI frequently to do my assignments.
INTAPP 2. I recommend using GenAI tools to my classmates.
INTAPP 3. Please indicate the probability that you use the GenAI.
INTAPP 4. I use GenAI tools every day.
INTAPP 5. I use GenAI whenever appropriate to do my assignments.
Knowledge sharing (Chhim et al., 2017)
KNSHR 1. You often share your experience or know-how when working with classmates.
KNSHR 2. You often provide work reports and official documents to classmates.
KNSHR 3. You often share knowledge, skills or information with classmates in class.
KNSHR 4. You often engage in the exchange and amalgamation of ideas with classmates to devise solutions to problems.
Analytical skills (Peng et al., 2004)
ANASKIL 1. Your beliefs must all be supported by evidence.
ANASKIL 2. To oppose someone's opinion, one must provide reasons.
ANASKIL 3. I consider myself a logical person.
ANASKIL 4. When dealing with difficult problems, first clarify the crux of the issue.
ANASKIL 5. I am good at handling problems in an organised manner.

Data Analysis Approach

In our study, partial least squares structural equation modelling (PLS-SEM) was used to test the hypotheses of this study. It was adopted to analyse the data set for several reasons (Hair et al., 2012; Zia et al., 2024). First, PLS-SEM is well-suited for predictive research and theory development, aligning with our goal of exploring the relationships between the application of GenAI, knowledge sharing and analytical skills. Second, it is effective for small sample sizes and non-normally distributed data, making it a robust choice for this study with 295 valid responses. Third, PLS-SEM can handle reflective and formative constructs. In this research model, all constructs are reflective, indicating that the indicators are manifestations of the construct.

SmartPLS 3.0 software was employed for the PLS-SEM analysis following a two-step approach proposed by Anderson and Gerbing (1988). First, the measurement model was assessed to ensure the constructs' reliability and validity. The indicator reliability, internal consistency reliability, convergent validity and discriminant validity were analysed. Second, after confirming the constructs' reliability and validity, the structural model was empirically tested, which included evaluating the significance and relevance of the structural model relationships as well as the

model's predictive capabilities and fit. Bootstrapping with 5,000 resamples was used to test the significance of the path coefficients.

RESULTS

Common Method Bias

To assess common method bias, the variance inflation factor (VIF) scores were calculated, revealing VIF values ranging from 1.454 to 2.945. These figures fall below the threshold value of 3.3 proposed by Kock and Lynn (2012), suggesting an absence of significant multicollinearity. Further investigation into potential common method bias involved Harman's single-factor test. This factor analysis technique, applied without rotation, showed that no single factor dominated the variance explanation. The primary factor accounted for only 27.704% of the total variance, smaller than 40%. This result aligns with the guidelines set out by Podsakoff et al. (2003), suggesting that common method bias is not a significant concern in this study.

Measure Model Assessment

As can be seen in Table 3, the composite reliability of all variables ranges from 0.845 to 0.893, larger than the critical value of 0.7, demonstrating the reliability of the measurements (Fornell & Larcker, 1981). Next, discriminant and convergent validity were tested, and all constructs had an average variance extracted (AVE) of over 0.5 and item loading values exceeding 0.7. Meanwhile, the results of the Fornell–Larcker criterion (Table 4), assessed discriminant validity by comparing the square root of the AVE with the correlations between various constructs and all the square roots of the AVE are larger than correlation coefficients between constructs, indicating that the measurements are discriminately valid.

Table 3. Reliability and Convergent Validity

Latent variables	Items	Loading	Average variance extracted	Cronbach's alpha	Composite reliability
Perceived usefulness	PU1	0.852	0.724	0.809	0.887
	PU2	0.826			
	PU3	0.874			
Perceived ease of use	PEU1	0.848	0.716	0.802	0.883
	PEU2	0.825			
	PEU3	0.865			
Application of GenAI	GAIA1	0.890	0.628	0.853	0.893
	GAIA2	0.823			
	GAIA3	0.754			
	GAIA4	0.717			
	GAIA5	0.766			
Knowledge sharing	KS1	0.836	0.652	0.823	0.882
	KS2	0.725			
	KS3	0.869			
	KS4	0.793			
Analytical skills	ANS1	0.699	0.523	0.773	0.845
	ANS2	0.736			
	ANS3	0.709			

	ANS4	0.757			
	ANS5	0.712			

Table 4. Discriminant Validity (Fornell–Larcker Criterion)

Latent variables	(1)	(2)	(3)	(4)	(5)
(1) Perceived usefulness	0.851				
(2) Perceived ease of use	0.523	0.846			
(3) Intention of application	0.618	0.585	0.792		
(4) Knowledge sharing	0.308	0.286	0.245	0.808	
(5) Analytical skills	0.370	0.339	0.285	0.463	0.723

Note: The diagonals denote the square root of the average variance extracted

Structure Model Assessment

Figure 2 offers empirical evidence supporting all hypotheses, revealing significant relationships between key constructs in this study of the application of GenAI in educational contexts. Specifically, there is a highly significant positive correlation between perceived usefulness and students' application of GenAI ($\beta = 0.430$, $p < 0.001$), indicating that the higher the students' perception of the practicality of GenAI tools, the more inclined they are to apply these tools in their learning. Furthermore, perceived ease of use exhibits a similarly significant positive correlation with students' application of GenAI ($\beta = 0.360$, $p < 0.001$). This finding suggests that the easier students perceive GenAI tools to be to get started with and use, the more likely they are to adopt these tools to aid their learning. Thus, the findings support H1 and H2, consistent with previous studies' argument (Duong et al., 2023; Shahzad et al., 2024) that once students believe GenAI tools are easy to use and helpful for learning, they are willing to apply GenAI in the learning process.

Furthermore, there is a significant positive correlation between students' application of GenAI and their knowledge-sharing behaviour ($\beta = 0.245$, $p < 0.001$), thus supporting H3. This finding echoes the view of Liu et al. (2023) that the application of emerging technologies can promote knowledge sharing among individuals or organisations. Moreover, we found that knowledge sharing significantly and positively affect analytical skills ($\beta = 0.418$, $p < 0.001$), and students' application of GenAI positively influence analytical skills directly ($\beta = 0.182$, $p < 0.001$). These two findings support H4 and H5, respectively, indicating that when students leverage GenAI tools to acquire more knowledge and actively engage in knowledge sharing, their ability to analyse problems is enhanced. Detailed empirical results can be found in Table 5.

The mediation effect analysis (Table 6) revealed more complex variable interactions. Perceived usefulness has significant indirect effects on knowledge sharing through the mediating variable of students' application of GenAI ($\beta = 0.106$, $P = 0.001 < 0.01$; 95%CI = [0.045, 0.175]). Meanwhile, perceived ease of use has significant indirect effects on knowledge sharing through the mediating variable of students' application of GenAI ($\beta = 0.079$, $P = 0.002 < 0.01$; 95%CI = [0.036, 0.150]). Similarly, students' application of GenAI mediates the relationship between analytical skills and perceived usefulness ($\beta = 0.077$, $P = 0.001 < 0.01$; 95%CI = [0.025, 0.135]), perceived ease of use ($\beta = 0.058$, $P = 0.012 < 0.05$; 95%CI = [0.019, 0.121]) and the chain mediation of 'application–knowledge sharing–analytical ability' (perceived usefulness: $\beta = 0.044$,

$P = 0.004 < 0.01$, 95%CI = [0.019, 0.078]; perceived ease of use: $\beta = 0.035$, $P = 0.006 < 0.01$, 95%CI = [0.015, 0.068]). Therefore, all mediating effects are supported.

Table 5. Empirical Results

Hypotheses	Sample mean	Standard deviation	Path coefficient	t-value	Results
H1 Perceived usefulness → Intention of application	0.430	0.053	0.430***	8.167	Accepted
H2 Perceived ease of use → Application of GenAI	0.362	0.058	0.360***	6.229	Accepted
H3 Application of GenAI → Knowledge sharing	0.247	0.068	0.245***	3.624	Accepted
H4 Knowledge sharing → Analytical skill	0.425	0.061	0.418***	6.800	Accepted
H5 Application of GenAI → Analytical skill	0.182	0.062	0.182***	2.950	Accepted

Notes: * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$.

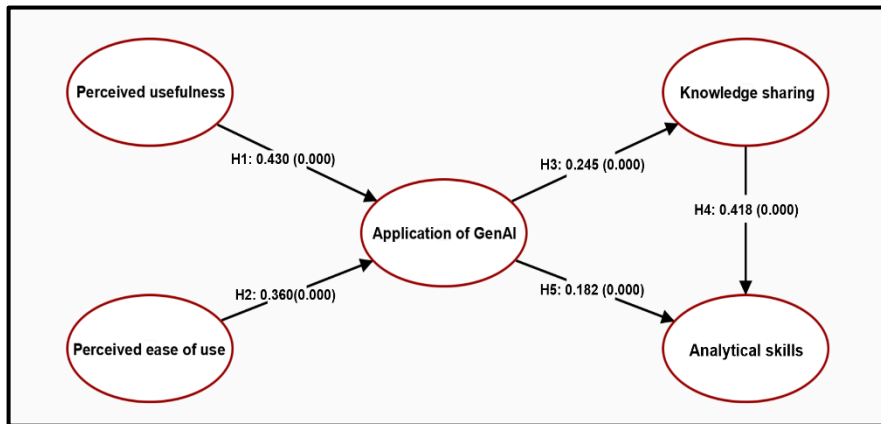


Figure 2. Test Results

Table 6. Mediation results

	Standard deviation (STDEV)	T statistics	P values
Perceived usefulness → Application of GenAI → Knowledge sharing	0.033	3.204	0.001
Perceived ease of use → Application of GenAI → Knowledge sharing	0.029	3.025	0.002
Perceived usefulness → Application of GenAI → Analytical skills	0.028	2.793	0.005
Perceived ease of use → Application of GenAI → Analytical skills	0.026	2.510	0.012
Perceived usefulness → Application of GenAI → Knowledge sharing → Analytical skills	0.015	2.887	0.004

Perceived ease of use → Application of GenAI → Knowledge sharing → Analytical skills	0.013	2.758	0.006
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DISCUSSION AND IMPLICATIONS

This study investigates the relationships between students' application of GenAI, knowledge sharing and analytical skills in the context of service education. Drawing on social constructivist theory, a revised TAM and social exchange theory as well as using data collected from 295 Chinese university students in service-related programs, a new research model was developed and tested empirically.

The findings reveal that students' perceptions of the usefulness and ease of use of GenAI influence their application of GenAI tools positively, supporting H1 and H2, which is similar to the findings of other studies (Shahzad et al., 2024). This suggests that when students believe GenAI is beneficial to their learning and easy to use, they are more inclined to adopt it. However, unlike previous research (Scherer et al., 2019), this study revised the TAM regarding the application of GenAI among students, by claiming that perceived usefulness and perceived ease of use of GenAI can affect users' application of GenAI directly. Such revision enables future TAM studies to simplify the research model while obtaining meaningful results easily.

Furthermore, the results indicate that students' application of GenAI positively affect their knowledge-sharing behaviour (supporting H3) and analytical skills (supporting H5). As students become more willing to leverage GenAI in their learning process, they are more likely to commit to sharing knowledge with their peers and develop stronger analytical thinking abilities. These findings comply with earlier studies on the relationships between the application of GenAI, knowledge sharing and critical thinking skills (Essel et al., 2024; Yeh, 2012). Such findings imply that the positive impact of GenAI use on analytical skills is partially transmitted through enhanced knowledge sharing. When students are motivated to use GenAI, they tend to participate more actively in knowledge exchange and discussion with others, thus nurturing their analytical skills.

Notably, by supporting H4, this study also uncovers the mediating role of knowledge sharing in the relationship between the application of GenAI and analytical skills, which reveals a divergent role of knowledge sharing in the application of GenAI. This study shows that knowledge sharing does not affect the adoption of GenAI (ChatGPT), nor moderate the relationship between the intention to use ChatGPT and the actual adoption of ChatGPT, whereas GenAI positively affects students' knowledge-sharing behaviour. This finding is consistent with the views of Liu et al. (2023) and Sumbal et al. (2024) that knowledge management techniques, such as GenAI tools, facilitate knowledge management activities, such as knowledge sharing.

It also can be found that our findings resonate with and extend studies conducted in other educational contexts. For instance, research in science, technology, engineering and mathematics (STEM) education has shown that GenAI competence can foster critical thinking and creativity among STEM students through chain mediating mechanisms (Otto et al., 2025), which parallels our finding that GenAI application enhances analytical skills through the mediating role of knowledge sharing. Similarly, studies in business and marketing education have demonstrated that GenAI tools can both support and challenge critical thinking development (Gonsalves, 2026),

echoing our results that the positive impact of GenAI on analytical skills operates through active knowledge exchange rather than passive consumption. This cross-disciplinary comparison underscores that while the positive relationship between GenAI and critical thinking appears to be generalizable across disciplines; the mediating pathways and boundary conditions may vary according to disciplinary epistemologies and pedagogical traditions.

Theoretical Implications

This research makes several noteworthy contributions to the theoretical understanding of the application of GenAI in education. First, it extends the TAM to the context of GenAI, demonstrating the applicability of perceived usefulness and perceived ease of use in explaining students' application of GenAI tools directly. While previous studies have examined the TAM in relation to specific GenAI tools, such as ChatGPT (Duong et al., 2023; Shahzad et al., 2024), this research broadens the scope by considering a wide range of GenAI tools. The empirical evidence reinforces the robustness of TAM constructs in predicting technology acceptance, even for cutting-edge AI technologies.

Second, this study enriches social constructivist theory and social exchange theory by accentuating the pivotal role of knowledge sharing and the application of GenAI in collaborative learning through mutual benefits. The findings suggest that students' engagement with GenAI can stimulate active knowledge exchange and co-construction of understanding, resonating with the core tenets of social constructivism (Vygotsky, 1986) and social exchange theory (Emerson, 1976). By identifying GenAI as a novel fundamental tool in social learning interactions, this research pushes the boundaries of social constructivist theory and social exchange theory in the era of AI.

Moreover, this study advances the understanding of critical thinking skills, particularly analytical skills, in the context of service education, including hospitality, tourism and sports-related programs, which aligns the findings in other education contexts (Otto et al., 2025; Gonsalves, 2026). While previous literature has explored the general impact of GenAI on critical thinking (Essel et al., 2024; Essien et al., 2024), this study offers a nuanced perspective by focusing on a specific skill dimension and disciplinary context. The findings reveal that GenAI usage, mediated by knowledge sharing, can positively shape students' analytical skills, validating the conceptual discussion on the GenAI–learning outcomes relationships empirically. This insight contributes to a more granular understanding of how GenAI interacts with different facets of critical thinking.

Notably, this study responds to the timely research call by Ray (2024) for an investigation of the role of GenAI in transforming service industry education, such as hospitality, tourism and sports-related programs. As one of the pioneering empirical studies in this area, this study offers valuable evidence and theoretical groundwork for further enquiry. By integrating the TAM, social constructivist theory, social exchange theory and critical thinking literature, this study offers a holistic framework for examining the educational implications of GenAI. The research model and findings lay the foundation for future studies to build on and advance the theoretical understanding of GenAI in shaping learning processes and outcomes.

Practical Implications

The findings of this study provide several practical recommendations to educators and higher education institutions, specifically in the field of service industry education. The results emphasise the importance of integrating GenAI into curriculum design and pedagogical practices. As students' application of GenAI positively influences their knowledge sharing and analytical skills, educators should actively seek ways to incorporate GenAI tools into their teaching. This may involve designing assignments and group projects that encourage students to leverage GenAI for research, analysis and problem-solving tasks. Moreover, by providing guidance and support in using GenAI effectively, educators can help students harness the potential of these tools to improve their learning outcomes.

Furthermore, this study underscores the crucial role of knowledge sharing in mediating the impact of using GenAI on developing analytical skills. This finding suggests that fostering a collaborative and interactive learning environment that promotes knowledge exchange among students should be a key priority for educators. Instructors can facilitate knowledge sharing by organising group discussions, team projects and peer assessment activities. By creating opportunities for students to share their ideas, insights and experiences using GenAI, educators can foster a culture of mutual learning and support the enhancement of critical thinking skills. The top management team should also demonstrate a positive attitude towards knowledge management to foster a continuous learning culture (Liu et al., 2018) in higher education institutions.

At an institutional level, higher education administrators should consider providing training and resources to faculty and students on effectively integrating GenAI into teaching and learning practices. This may include workshops, seminars or online courses that cover the technical aspects of using GenAI tools, as well as the pedagogical strategies for incorporating them into different subject areas. By equipping educators with the necessary skills and knowledge, institutions can foster a widespread and impactful adoption of GenAI across various programs and disciplines.

Furthermore, higher education institutions should invest in technological infrastructure and support systems required to support the seamless integration of GenAI into educational configurations. This may involve collaborating with GenAI providers, setting up dedicated labs or resource centres and providing technical assistance to faculty and students. By creating an environment for GenAI adoption, institutions can position themselves at the forefront of educational innovation and prepare their students for the demands of the rapidly evolving professional landscape.

Finally, the findings of this study underscore the transformative potential of GenAI in reshaping the future of service education. As the field continues evolving and adapting to the challenges and opportunities posed by technological advances, embracing GenAI, as a powerful tool for improving students' knowledge sharing and analytical skills, will be essential. By integrating GenAI proactively into educational practices and fostering a culture of collaborative learning, educators and institutions can empower students to succeed in an increasingly uncertain and dynamic world.

CONCLUSION

This study demonstrates that students' perceived usefulness and ease of use of GenAI positively affect the application of GenAI. Meanwhile, knowledge sharing plays a mediating role in the relationship between the application of GenAI and analytical skills. Despite its contributions, this study has several limitations that future research can address. First, this study only examined one dimension of critical thinking skills, namely, analytical skills. Future research could explore other dimensions of critical thinking skills, such as inference and evaluation. Second, this study focused on the individual level by examining students; hence, future investigations could extend to the organisational level to examine how institutional factors influence the adoption and impact of GenAI in education and organisational learning (Liu et al., 2023). Third, the cross-sectional design of this study captures perceptions and skills at a single point. Therefore, longitudinal designs could provide a more dynamic understanding of the relationships between GenAI usage, knowledge sharing and analytical skills. Fourth, the valid responses to the survey are primarily from students studying tourism management in China, potentially limiting the generalisability of the empirical findings. Future studies may collect more data from more service industry-related programs in different countries and regions. Finally, future studies can combine self-report measures with objective data sources, such as learning analytics or performance evaluations, to reveal other dimensions of learning outcomes.

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