

THE ROLE OF PERCEIVED TRUST AS A MEDIATOR FACTOR WITHIN THE KNOWLEDGE, ATTITUDES, AND PRACTICE (KAP) MODEL IN CHATGPT ADOPTION

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Abstract

The rapid spread of the use of ChatGPT in the education sector was prominent. University students, in particular, started experimenting with ChatGPT immediately, and very few studies explore ChatGPT adoption mechanisms due to its newness. This study examined how knowledge, attitude, and practice influence students' intention to adopt ChatGPT in their learning. Using an extended KAP model, this paper developed and empirically tested a model explaining students' adoption of ChatGPT. In total, 384 respondents from a representative sample of Jordanian Universities were surveyed. The hypotheses were analyzed using structural equation modelling (SEM). The results showed that the students' adoption of ChatGPT is influenced by three major factors: knowledge (K), Attitude (A), and Practice (P). However, Trust (T) was insignificant in moderating students' adoption of ChatGPT. The study contributes to the new knowledge regarding the moderating effects of Trust as part of the KAP model, which has been a significant concern in the literature on education application. These findings can be helpful to policymakers in the education sector to advance their understanding of ChatGPT adoption mechanisms.

Keywords: ChatGPT; Technology Adoption, KAP model, Perceived Trust, Education, Jordan.

1 Introduction

Each industrial revolution has brought forth both advantages and socio-economic challenges. However, the fourth industrial revolution (Industry 4.0) stands out due to its extensive impact on society, encompassing various dimensions such as productivity, employment, privacy, and democratic processes (Schwab, 2017).

One of the key technological developments in this new era of Industry 4.0 is artificial intelligence (AI). The concept of AI is not new (Haenlein and Kaplan, 2019), but rather a kind of rebirth due to many changes in different aspects, which included the widespread availability of data and the remarkable new applications as part of Industry 4.0 (Khan and Alkaabi, 2021). The timely combination of the new technological developments in hardware, such as the rise in computing power and big data analytics and the new software capabilities, contributed significantly to the emergence of sophisticated AI algorithms. These new systems can go beyond recognizing patterns and continue to learn and improve independently (Tan, 2020).

AI is anticipated to disrupt the labor market. Hence, jobs will be affected dramatically, eventually begging governments to design effective policies to tackle such dramatic changes, as Susskind (2020) suggests. In education, AI has been used in administration and faculty instruction, and studies showed that it performs different administrative functions, such as reviewing and grading students' assignments more effectively and efficiently and achieving higher quality in their teaching activities (Chen, L. et al., 2020).

An important area that is relevant and accessible to users is content generation, where users can easily create digital content using simple text-based inputs, as was the case in ChatGPT, which gave the public a taste of the powerfulness of AI. Although it was introduced recently, in November 2022 (Haleem et al., 2022), ChatGPT has spread quickly and has been adopted by many users. It was reported that it is one of the fastest growing App of all time (it took less than three months to reach 123 million monthly unique visitors (Wodecki, 2023)). Education was one of the key sectors to experiment with ChatGPT. As with most technologies, users (here, students and teachers) do not wait for institutions and regulators to sort out the system's useful and harmful functions and address any ethical issues. So it is still early to understand the impact of ChatGPT on education, considering the scarce research studies and the limited literature that assesses its full potential, usefulness, and risks in learning and teaching activities (Rudolph et al., 2023).

ChatGPT can greatly help students produce academic writing, including articles and essays, and this has been a worry to educators since technology performance usually continues to improve. Frye (2022) Argues that educators need to stop asking superficial questions which AI text generators, such as ChatGPT, can answer. Instead, the teacher can incorporate ChatGPT in the classroom to prompt competition, in-class preparatory process, using more dynamic assessment techniques, feedback, scaffolding, and instructor assistance (Anders, 2023).

ChatGPT demonstrated outstanding results in generating realistic and acceptable text that imitates scholarly writing style. However, the initial research in the credibility of its output has been challenged in terms of scientific errors and fictional pieces of evidence. Borji (2023) argues that ChatGPT has problems in areas such as reasoning, mathematical problem-solving, and reducing

bias, and it is not clear if such issues will be resolved with the current technology capabilities. ChatGPT can fabricate sources that don't exist if not able to match relevant sources to any given topic, which results in fooling scientists into thinking they were real reports nearly one-third of the time (Bushard, 2023). The challenges in the education sector are the most apparent due to the lack of well-developed guidelines and ethical codes around generative AI (Dwivedi et al., 2023), which resulted in some educational institutions to restricting access to ChatGPT for school and university students (Yu, 2023).

This paper focuses on the students in terms of knowledge, Attitude, practices, Trust and adoption of ChatGPT. It investigates the underlying determinants of ChatGPT adoption utilizing the KAP model (knowledge, attitudes, and Practice) and trust as mediator factors.

2 Research Background

2.1 Knowledge, Attitude, and Practice (KAP) Model

Individuals usually use more than knowledge to make decisions regarding any situation they face. For instance, in decisions regarding sustainability and the environment, nudges that rely on information only can be useful (Carlsson et al., 2021). However, in many cases, the effectiveness is in the attitudes towards the issue and behavioral intentions (Liu et al., 2020). Knowledge, Attitude, and practice (KAP) model is ideal in novel phenomena; hence it is popular in healthcare because they provide useful information and can be implemented with a small budget targeting an easily accessible population, as we have seen in the case of COVID-19 pandemic (Andrade et al., 2020). In our case, the intention to use and adopt new and disruptive technology (ChatGPT) requires investigating current and potential users (university students) regarding knowledge, Attitude, and Practice. Studying technology adoption may require going beyond the technology adoption lifecycle theory and perhaps combining more than one model or theory. Hansen et al. (2018) combine the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) to identify issues that affect technology adoption of new phenomena such as social media. These include risk, innovation, complexity, usability, compatibility, and peer effect.

2.2 Technology adoption in education

According to the Innovation Diffusion Theory, which concentrates on determinant attributes of users' perceptions and use of innovations (Menzli et al., 2022), technology adoption starts with technology acceptance before it is integrated and fully embraced. The Attitude toward the technology usually measures this. In education, popular theoretical approaches include diffusion of innovation theory (DOI), Unified Theory of Acceptance and Use of Technology (UTAUT), and Motivational Model (MM) (Granić, 2023). Other scholars also tried to combine theories, such as Hansen et al. (2018) but also added factors and constructs to explain behavioral intention in the context of radical innovation. For instance, (Acikgoz et al., 2023) combined the diffusion of innovation theory (DOI) and the theory of planned behavior (TPB), including the construct of curiosity, to assess its effect on behavioral intention regarding a new technology such as the smartwatch. Another study used an advanced version of TAM with DOI to investigate the

influencing factors of students' behavioral intentions to use the e-learning system (Al-Rahmi et al., 2019).

The application of knowledge, Attitude, and Practice (KAP) in assessing new technology and methods in education has been used to assess the impact of the technology involvement, such as the use of ICT and e-learning (Luo et al., 2017; Yunos et al., 2022; Al-Soluiman et al., 2020). A protocol to use KAP in pharmacy practice and education has been suggested with the objective of assessing knowledge, Attitude, and practice towards ChatGPT (KAP-C) in this domain (Mohammed et al., 2023). However, the literature has not discussed utilizing the KAP model and the associated factors to predict the adoption of new technology and using Trust as a mediator factor. This study fills the gap by utilizing the KAP model to assess ChatGPT as a new technology that has high anticipation in education.

2.3 Trusting technology

Before dwelling on the challenges and risks of ChatGPT and indicating the extreme responses to such technology, such as prohibiting it at all (Dibble, 2023), it is fair to clarify that recent research and testing showed that ChatGPT performed differently according to the subject domains. For instance, it performed very well in economics and relatively well in coding and programming but not so well in mathematics (Lo, 2023).

ChatGPT can provide different learning avenues to assist university students in advancing their critical thinking, problem-solving skills, quick comprehension to organize their thoughts for writing, finding unexplored topics, and identifying information and resources (Kasneci et al., 2023). However, the twenty-three authors of the mentioned cited commentary ascertain the risks of ChatGPT and large language models in education in general when it comes to education. Key issues raised that affect the Trust in this system are understanding its limitations and potential biases, copyright, effective integration and training, data privacy and security, sustainability, integrity, and user-friendliness.

As with most emerging technologies, users take time to trust them and seek guidance before embracing them, with the exception of innovators and early adopters (Moore and McKenna, 1999). Trust is a critical success factor when it comes to using technology, especially in the online environment (Hansen et al., 2018).

In the education context, higher education institutions need to provide guidance to students on the ethical implications of ChatGPT and the boundaries concerning their capabilities (Dwivedi et al., 2023). Trust and transparency are key issues that need to be addressed, especially in producing scientific research studies, as discussed in the Finance research domain by Dowling and Lucey (2023), which could be generalized across other research domains. Moreover, there are pieces of evidence that ChatGPT may provide biased output (Chen, Y. et al., 2023), which is a very serious problem in education and research, considering the progress that has been made in these issues in education and other areas.

The response from educators towards the use of AI in education, including ChatGPT, is mixed, and the main concern remains the ethical issues before trusting the technology and deploying it

within the educational system (Mhlanga, 2023). Sallam (2023) used a systematic review of recent studies to identify benefits and concerns regarding ChatGPT in healthcare education, research, and Practice and demonstrated that concerns are higher than benefits. The issues of concern raised included copyright, transparency, bias, plagiarism, lack of originality, inaccurate content, limited knowledge, and incorrect citations, which can affect Trust in the system.

3 Conceptual Framework and Hypotheses Formulation

The current research investigates the impact of knowledge, attitude, and practices on students' adoption of ChatGPT, with the mediating effect of student trust in ChatGPT (Figure 1). Accordingly, the research hypotheses formulated as follows:

- H1: There is a significant positive impact of knowledge on students' adoption of ChatGPT.
- H2: There is a significant positive impact of Attitude on students' adoption of ChatGPT.
- H3: There is a significant positive impact of Practice on students' adoption of ChatGPT.
- H4: There is a significant positive impact of Practice on students' Trust of ChatGPT.
- H5: Trust mediating the relationship between Practice and students' adoption of ChatGPT.

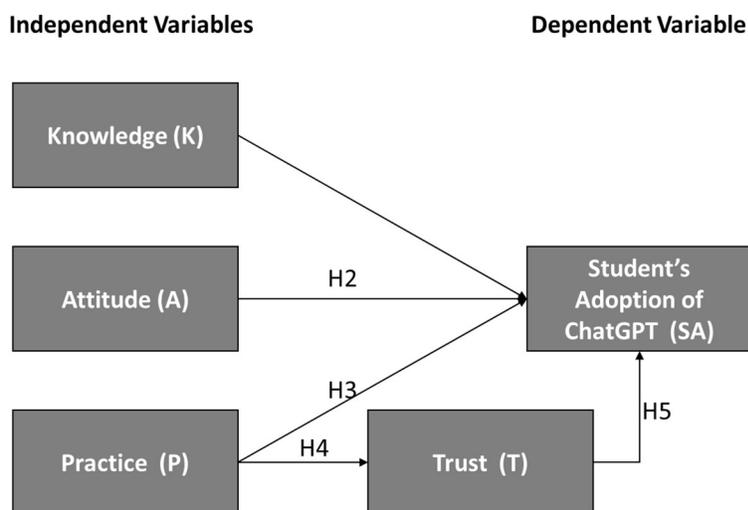


Figure 1. The Research Model

The researchers developed the model for this research based on the findings from a comprehensive literature review regarding to the use of knowledge, attitude, and practices in influencing the adoption of new technology. The complete list of the derived items for each variable and the relevant sources, is shown in

Table 1.

Table 1. Measurements Revised Items

Variable	Items	Adopted from

Knowledge	
<p>I am concerned about the ChatGPT</p> <p>I am aware of the ChatGPT</p> <p>I have knowledge of ChatGPT applications</p> <p>I have knowledge of ChatGPT sources of information</p> <p>I have knowledge of the academic institute regulations and penalties regarding the use of ChatGPT.</p>	<p>Yunos et al., (2022); Mohammed et al., (2023); Luo L, (2017); Andrade C, (2020), Ahmad, et al, (2020); Al-Refai et al, (2020); Ahmad et al, (2022).</p>
Attitude	
<p>In my opinion, we should utilize ChatGPT in our academic assignments.</p> <p>We need to use ChatGPT in our academic assignments.</p> <p>In my opinion, ChatGPT enriches perceived benefits in solving my academic assignments.</p> <p>I'm concerned about the reliability of the information provided by ChatGPT.</p> <p>I have a high motivation to use ChatGPT.</p>	<p>Yunos et al., (2022); Mohammed et al., (2023); Luo L, (2017); Andrade C, (2020); Kasilingam DL (2020) Al-Refai et al, (2020); Ahmad et al, (2022).</p>
Practices	
<p>I frequently use the ChatGPT in solving my assignments.</p> <p>I find ChatGPT helpful in solving many academic tasks.</p> <p>I find ChatGPT cover a wide range of subjects and topics.</p> <p>I find ChatGPT easy to use for subjects and topics.</p>	<p>Yunos et al., (2022); Mohammed et al., (2023); Luo L, (2017); Andrade C, (2020) Al-Refai et al, (2020).</p>
Adoption of ChatGPT	

	<p>I use ChatGPT as the primary technology way instead of search engines.</p> <p>I intend to use or continue to use ChatGPT services in the future.</p> <p>I will recommend others to use ChatGPT services.</p> <p>I would always prefer using ChatGPT services.</p> <p>I am satisfied with the advantages that ChatGPT services usage brings.</p>	<p>Yu H (2023); Wodecki B (2023); Sallam M (2023); Rudolph et al., (2023); Mohammed et al., (2023); Mhlanga D (2023); Kuberkar S and Singhal TK (2020)</p>
Trust		
	<p>ChatGPT services are reliable.</p> <p>ChatGPT services are secure.</p> <p>ChatGPT services are trustworthy.</p> <p>I trust the information provided by ChatGPT</p> <p>Overall I trust ChatGPT services.</p>	<p>Abdallah Q. Bataineh., (2017). Ahmad, A, (2016).</p>

4 Research Methodology

This section contains a description of the method of data collection in addition to a description of the study population and the sample chosen, as well as the measurement and scaling. Lastly, this section demonstrates the results of the questionnaire.

4.1 Research Design

The most suitable type of research for the chosen matter is causal research since this paper aims to study a cause-and-effect relationship (KAP model and Student adoption of ChatGPT) as a direct effect. KAP model and Student adoption of ChatGPT mediated by student trust as an indirect effect.

4.2 Data Collection Method

This research conducts a questionnaire-based survey with a five-point Likert Scale. Participants were asked to rate how strongly they agreed with each statement on a scale of strongly disagree (1) to strongly agree (5), with a middle point representing a neutral level of agreement. The primary data was collected through an online questionnaire.

4.3 Population, Sample, and Procedure

University students in both public and private sectors are the target demographic of this study. Respondents are chosen based on the convenience sampling technique. A total of five public universities and five private universities in Jordan were contacted to collect data in the 2022/2023 academic year. After obtaining approval from these universities, an email with the online form of the questionnaire was sent to the responsible parties, who in turn sent it to all of their university students. The valid research respondents are 384.

4.4 Measurement and Scaling

The literature review presented in Section 3 was examined to collect well-defined and tested measurement scales for the variables used in this study. Items were revised to suit the communication and interaction context. The independent variables are the key components of the KAP model, namely, Knowledge, Attitude, and Practices. The second construct is the dependent variable represented by the student adoption of ChatGPT. The third construct represents student trust in ChatGPT.

5 Analysis and Results

5.1 Descriptive Analysis

Out of the 414 responses received, only 384 were analyzed; the remaining 30 were excluded since they didn't match the conditions to proceed to the survey items. As shown in Table 2, the demographics data revealed that most responders were female (about 64 percent). Nearly 54 percent of the respondents were between the academic year level of the first and second year. Regarding university ownership, approximately 56 percent of the respondents are in private universities. Nearly 70 percent of the respondents belong to scientific schools.

Table 2. The Demographic Data

Item		Frequency	Percent
Gender	Female	244	63.5
	Male	140	36.5
	Total	384	100.0
Education level	Post-Graduate	102	26.6

	1 st and 2 nd year	208	54.2
	3 rd and 4 th year	62	16.1
	5 th and 6 th year	12	3.1
	Total	384	100.0
University ownership	Government	170	44.3
	Private	214	55.7
	Total	384	100.0
Type of school	Humanities	118	30.7
	Scientific	266	69.3
	Total	384	100.0

5.2 Reliability and Validity by Confirmatory Factor Analysis (CFA)

To ensure the reliability and validity of data before executing (SEM), the researcher used Confirmatory Factor Analysis (CFA) by (AMOS) software, (CFA) includes all measurement models in the study. Confirmatory Factor Analysis (CFA) was conducted for all variables connected together (Pool CFA).

Each measurement model consists of the latent variable with related factors to estimate the values of loading factors. The loading factor value for each indicator is the standardized coefficient between the factor and its related variable. Average Variance Extracted (AVE) value is calculated for each variable and equal to the average value of loading factors' squares. To ensure validity and reliability of data ad scales, three tools were used:

- Convergent reliability: Assessed based on the value of Average Variance Extracted (AVE) for each variable.
- Discriminant Validity: Indicates the correlation between variables.
- Composite Reliability (CR): Assessed using (AVE) value to test the reliability of data.
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The Average Variance Extracted (AVE) was calculated based on the factor loading values for each variable. (AVE) is used to evaluate each variable's convergent validity and Composite Reliability (CR). Hair et al. (2014) recommend the value of composite reliability to be equal to or greater than 0.7, and the study by Fornell and Larcker (1981) recommended a value of (AVE) to be more than 0.5 to satisfy the convergent validity.

Table 3 shows the values of all factor loadings, (AVE) and (CR) for all variables. The results of (CFA) showed that item a4 is insignificant, so it was removed from the analysis. Based on the values of (AVE) and (CR) for all variables, the researcher concluded that convergent validity and composite were satisfied.

Table 3. Results of (CFA) and convergent validity and composite reliability for all variables

Path			Estimate	S.E.	C.R.	P	(AVE)	(CR)
k4	<---	K.	1.011	.091	11.158	***	.50	.79
k3	<---	K.	.568	.096	5.896	***		
k2	<---	K.	.853	.089	9.574	***		
k1	<---	K.	1.000					
a5	<---	A.	1.073	.080	13.432	***	.69	.82
a4	<---	A.	.066	.087	.759	.448		
a3	<---	A.	.846	.069	12.268	***		
a2	<---	A.	.793	.062	12.820	***		
a1	<---	A.	1.000					
p4	<---	P.	.884	.067	13.256	***	.61	.86
p3	<---	P.	.940	.067	14.124	***		
p2	<---	P.	1.000					
p1	<---	P.	.856	.076	11.192	***		
sa1	<---	SA.	.861	.072	12.013	***	.70	.92
sa2	<---	SA.	1.000					
sa3	<---	SA.	1.004	.056	17.794	***		
sa4	<---	SA.	.950	.060	15.770	***		
sa5	<---	SA.	.899	.054	16.740	***		
t5	<---	T.	.903	.049	18.440	***	.79	.95
t4	<---	T.	.963	.046	20.717	***		
t3	<---	T.	1.006	.037	27.274	***		
t2	<---	T.	1.000					

t1	<---	T.	.887					
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To ensure discriminant validity, the correlations between independent variables were estimated (Table 4), and the discriminant validity test was evaluated by the correlations between variables, with the maximum allowable being 0.85. Since none of the correlations was more than 0.85, this confirms discriminant validity was satisfied.

Table 4. Correlation between variables by (CFA)

Path	Estimate	S.E.	C.R.	P
K. <--> A.	.557	.086	6.477	***
K. <--> P.	.680	.096	7.093	***
K. <--> SA.	.675	.095	7.075	***
A. <--> P.	.764	.098	7.810	***
A. <--> SA.	.798	.100	7.970	***
T. <--> A.	.643	.085	7.591	***
T. <--> P.	.713	.090	7.951	***
T. <--> SA.	.719	.090	8.000	***
T. <--> K.	.528	.081	6.479	***

The above results confirm that the convergent validity, composite reliability, and discriminant validity were satisfied, and this proves that all the variables were valid and reliable.

5.3 Testing of Hypotheses by Structural Equation Modelling (SEM)

The hypotheses analysis was conducted utilizing the SEM based on the conceptual model to evaluate the significance of the effects of the different relationships, as shown in Figure 2 and Figure 3.

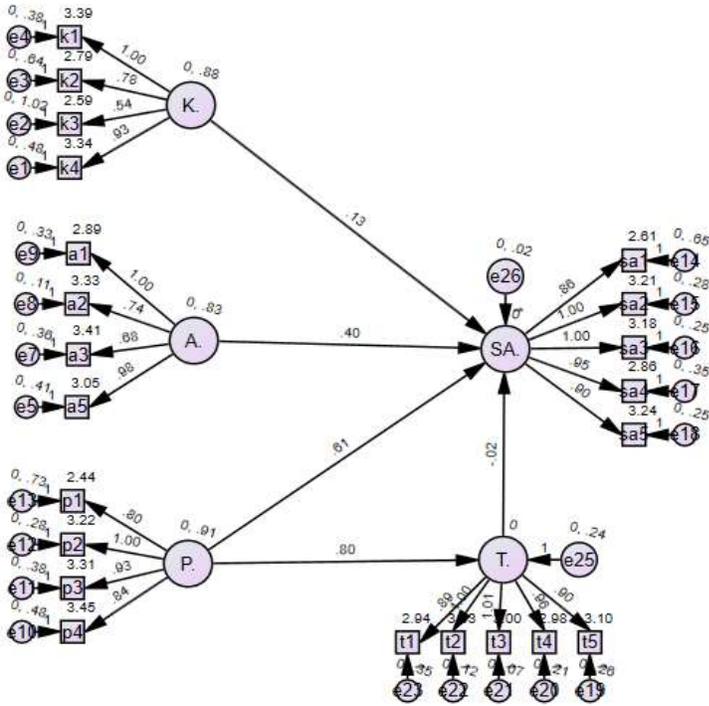


Figure 2. Unstandardized regression weights of (SEM)

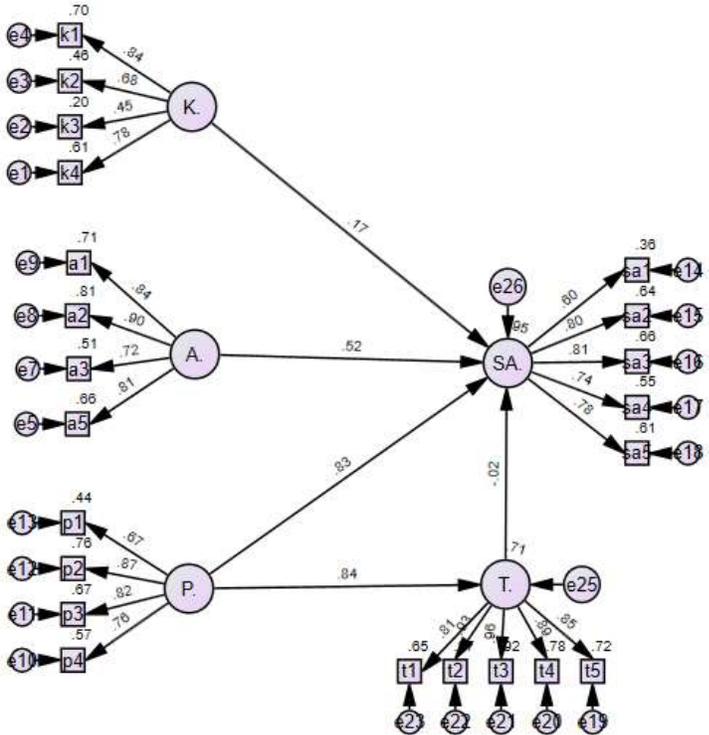


Figure 3. Standardized regression weights of (SEM)

The output of the SEM in Table 5 shows those relationships that are significant at ($P < .001$), and the value of the Standardized regression weights of (SEM). The Squared Multiple Correlations (R-Square) for Trust variable (T.) was 0.710 and 0.955 for students' adoption (SA.)

Table 5. Output of (SEM)

Path	Estimate	S.E.	C.R.	P	Estimate of Standardized regression weights of (SEM)
T. <--- P.	.801	.059	13.528	***	.843
SA. <--- K.	.129	.033	3.876	***	.172
SA. <--- A.	.398	.042	9.579	***	.517
SA. <--- P.	.610	.084	7.286	***	.831
SA. <--- T.	-.019	.075	-.250	.802	-.024

Based on the results of (SEM), the results of the hypothesis can be explained as follows:

- **H1:** The knowledge has a significant impact on students' adoption of ChatGPT at ($P < .001$) and $\beta = .172$.
- **H2:** The Attitude has a significant impact on students' adoption of ChatGPT at ($P < .001$) at ($P < .001$) and $\beta = .517$.
- **H3:** The Practice has a significant impact on students' adoption of ChatGPT at ($P < .001$) at ($P < .001$) and $\beta = .831$.
- **H4:** The Practice has a significant impact on Trust at ($P < .001$) and $\beta = .843$.
- **H5:** The Trust does not have a significant impact on students' adoption of ChatGPT at ($P < .001$) with ($P = 0.802$).

The value of R-square of students' adoption of ChatGPT is 0.955, which means that 95.5% of students' adoption of ChatGPT is explained by the three factors: knowledge, Attitude, and Practice.

6 Discussion

The results show the positive impact of KAP on adopting ChatGPT, which is similar to KAP but in adopting an e-learning platform (Luo et al., 2017). The specific KAP components also showed a significant relationship.

Based on the results of data analysis, the knowledge has a significant impact on students' adoption of ChatGPT at ($P < .001$) and $\beta = .172$, which supports hypothesis H1. A systematic and extensive literature review by Kelly et al. (2023) showed that the relevant factors to knowledge that can contribute to the acceptance of AI include perceived usefulness, performance expectancy, and effort expectancy.

The Attitude has a significant impact on students' adoption of ChatGPT at ($P < .001$) and $\beta = .517$, which supports hypothesis H2. Kasilingam's study showed that attitude, personal innovativeness, and trust directly influence the intention to use smartphone Chabot's in shopping (Kasilingam, 2020). Attitude was also identified as a key factor for AI adoption in general (Kelly et al., 2023). The Practice has a significant impact on students' adoption of ChatGPT at ($P < .001$) and $\beta = .831$, which supports hypothesis H3. According to our measurement, the comparable concept to practice is the experience, which in many studies showed that the effect of behavioral intention on

technology use will decrease as experience increases (Venkatesh et al., 2012). However, these studies are in a consumer-oriented context (Gansser and Reich, 2021). The Practice has a significant impact on Trust at ($P < .001$) and $\beta = .843$, which support hypotheses H4, which shows that Trust could come after usage, while Choudhury and Shamszare (2023) concluded in their empirical study that it can be in the opposite direction as well, for ChatGPT.

The Trust does not have a significant impact on students' adoption of ChatGPT ($P = .0802$). Hence, the risk was apparent and influenced the adoption. These results are in line with the study (Hansen et al., 2018), which looked at the use of social networking services for commerce. In a recent study on ChatGPT, Trust demonstrated a significant direct effect on intent to use and actual use (Choudhury and Shamszare, 2023). Trust also proved to be a key factor influencing the adoption intention of AI Chabot for public transport applications (Kuberkar and Singhal, 2020). Nataraja et al. (2017) also showed that perceived risk plays a major role in deciding the intention to use mobile shopping applications.

7 Conclusion

The rapid integration of ChatGPT into the educational landscape has been controversial, with university students rushing to use it as part of their learning process. Educators are still in the process of understanding its capabilities, benefits, and what makes the student adopt it. Considering the novelty of ChatGPT's presence in this context, this study delves deep into the factors that shape students' willingness to incorporate ChatGPT into their learning experiences, specifically focusing on knowledge, attitude, and practice, which are the key components of the Knowledge, Attitude, and Practice (KAP) model. This study has extended and tested the KAP model concept empirically to explain the dynamics of ChatGPT adoption among university students.

The results of this empirical study demonstrated the fundamental roles played by knowledge, attitude, and practice in influencing students' adoption of ChatGPT. An exciting and somewhat unexpected revelation from our research was the negligible role of trust in moderating students' adoption of ChatGPT. In contrast to the anticipated role of trust in technology adoption, it did not emerge as a significant factor in this study, indicating the distinctive character of ChatGPT's adoption within the educational sector.

The implications of the aforementioned findings extend to education policymakers, offering them valuable insights into the mechanisms underlying ChatGPT adoption among university students. As new technologies, and AI in particular, will continue to evolve, there is a need to keep testing different adoption models and identify the related critical factors. Hence, effective policies can be devised to ensure the smooth integration of technologies like ChatGPT into the education system.

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