

## Validating factors affecting junior high school students' use of ChatGPT in learning based on the IS success model and the technology readiness index

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**Abstract:** The sudden emergence and rapid rise of ChatGPT, along with its widespread use, make it highly accessible and convenient. As long as there is mobile network access, it can be utilized, providing a convenient way of life for some people. For instance, many use ChatGPT in academic learning. However, it also brings fear and unease to others, such as concerns about privacy, or resistance to developing independent learning skills. This study explores why high school students use ChatGPT for learning purposes. Based on the theories of technology readiness and the information system success model, this study examines the factors influencing high school students' use of ChatGPT. A survey was conducted among high school students who use ChatGPT, collecting 164 valid responses, which were analyzed using SmartPLS. The findings indicate that information quality, innovativeness, and optimism are the main factors influencing high school students' use of ChatGPT in learning. The results provide valuable insights for teachers to enhance their teaching practices.

**Keywords:** ChatGPT, the IS success model, technology readiness, use of ChatGPT in learning, junior high school students.

### 1. Introduction

With the development of artificial intelligence, the emergence of ChatGPT has enabled real-time interaction between humans and AI. Users can ask questions and receive immediate feedback from ChatGPT. The interaction is pressure-free, and users can access ChatGPT at any time. As a result, it not only serves as a convenient tool for learning but also fosters interaction and discussion among learners.

However, ChatGPT also presents challenges, such as security and privacy concerns. This study is therefore motivated to explore junior high school students' use of ChatGPT for learning purposes. It aims to better understand how students adopt ChatGPT in their learning.

### 2. Literature background

#### 2.1 ChatGPT

ChatGPT, developed by OpenAI in December 2022, is an artificial intelligence chatbot program officially known as Chat Generative Pre-trained Transformer. In addition to engaging in fluent conversations, ChatGPT can perform various functions, such as searching for information and translating text. It can even tailor its responses and actions based on the user's current needs, including replying to emails, writing poems or songs, and coding programs. By March of the following year, ChatGPT evolved with the development of a more advanced model based on the GPT-4 architecture. This upgrade brought ChatGPT closer to human-like interaction, with significant improvements in learning accuracy, correctness, and professionalism, making it even more remarkable.

ChatGPT shares some functional similarities with other AI products, particularly conversational capabilities. However, what sets it apart is its ability to write documents, debug code, create academic papers, and even program using languages like Java. Another distinctive feature is its emphasis on quality and moderation;

ChatGPT actively filters out inappropriate or harmful language from user inputs. Its widespread accessibility and convenience are also notable—users can operate it via mobile internet with no cost involved. Due to its ease of use, ChatGPT has become an integral part of many people's daily lives, enhancing their productivity and overall quality of life.

## 2.2 The IS success model

The IS success model proposed by DeLone and McLean (1992; 2003) is a comprehensive and layered theoretical framework that evaluates the success of information systems through six key dimensions, which are interconnected to form an integrated assessment system. The six dimensions of the DeLone and McLean IS success model complement each other and serve as a powerful tool for evaluating the effectiveness of information systems. The six dimensions include system quality, information quality, service quality, system use, user satisfaction, and net benefits.

Among the dimensions, system quality, information quality, and service quality affect users' system use. To understand users' adoption of ChatGPT in learning, this study intends to understand the impact of these three quality dimensions on use of ChatGPT.

## 2.3 Technology Readiness Index (TRI)

The Technology Readiness Index (TRI), proposed by Parasuraman (2000), is a psychometric tool designed to assess individuals' readiness and acceptance of new technologies. The index is based on four key dimensions: Optimism, Innovativeness, Discomfort, and Insecurity. Optimism and Innovativeness are positive factors that drive technology adoption, whereas Discomfort and Insecurity are negative factors that may hinder acceptance. TRI provides a practical framework for understanding consumer behavior and technology adoption and has been widely applied across various domains.

TRI has found extensive application in fields such as consumer behavior, healthcare, education, and financial technology to evaluate individuals' or groups' acceptance of technology. For instance, in the healthcare domain, TRI is often used to assess patients' willingness to adopt telemedicine and health applications (Lin & Hsieh, 2012). Additionally, TRI has been integrated with the Technology Acceptance Model (TAM) to explore the interaction between technological features and consumer psychology, thereby explaining technology adoption behaviors (e.g., Lai & Lee, 2020).

Recent studies have extended and refined TRI to meet the needs of the digital transformation era. For example, TRI 2.0 is a revised version of the original scale, incorporating more items that reflect the characteristics of contemporary technologies, such as artificial intelligence (AI) and blockchain (Parasuraman & Colby, 2015). This study thus intends to understand the four dimensions on users' adoption of ChatGPT in learning.

## 2.4 Hypotheses

### 2.4.1 The impact of system quality, information quality and service quality on junior high school students' use of ChatGPT in learning

System quality is to evaluate the technical aspects of information systems. It ensures the system quickly responds to users and provides stable operation. Information quality is to evaluate the value and reliability of the information provided by the system. It assesses whether the information meets user needs, such as relevance. Service quality is to ensure the support services provided by the system meet user expectations. System use assesses users' dependence on the information system. Based on DeLone and McLean (2003), the three hypotheses are proposed.

- H1. System quality of ChatGPT affects junior high school students' use of ChatGPT in learning.
- H2. Information quality of ChatGPT affects junior high school students' use of ChatGPT in learning.
- H3. Service quality of ChatGPT affects junior high school students' use of ChatGPT in learning.

### 2.4.2 The impact of optimism, innovativeness, discomfort, and insecurity on junior high school students' use of ChatGPT in learning

Optimism refers to a positive and proactive attitude, where individuals believe that technology can enhance their living environment and conditions. People with high optimism are not resistant to new technology; instead, they are highly willing to adopt and use it (Parasuraman, 2000).

Innovativeness represents an individual's proactive approach to exploring, learning, and adopting new technologies. Those with high innovativeness are more open to technological advancements and are often early adopters of new technologies (Parasuraman, 2000).

Discomfort reflects an individual's feelings of unease or anxiety towards new technology. These individuals often believe they lack the knowledge to effectively use the technology, leading to resistance and a defensive attitude. They perceive new technologies as challenging and intimidating (Parasuraman, 2000).

Insecurity denotes a sense of doubt or concern regarding the impact of new technology. Individuals with high insecurity worry about issues like personal data exposure, threats to privacy, and financial risks. These suspicions can result in slower adoption of new technologies (Parasuraman, 2000).

Based on Parasuraman (2000), the four hypotheses are proposed.

H4. Optimism of ChatGPT affects junior high school students' use of ChatGPT in learning.

H5. Innovativeness of ChatGPT affects junior high school students use of ChatGPT in learning.

H6. Discomfort of ChatGPT affects junior high school students' use of ChatGPT in learning.

H7. Insecurity of ChatGPT affects junior high school students' use of ChatGPT in learning.

The conceptual research model is shown in Figure 1.

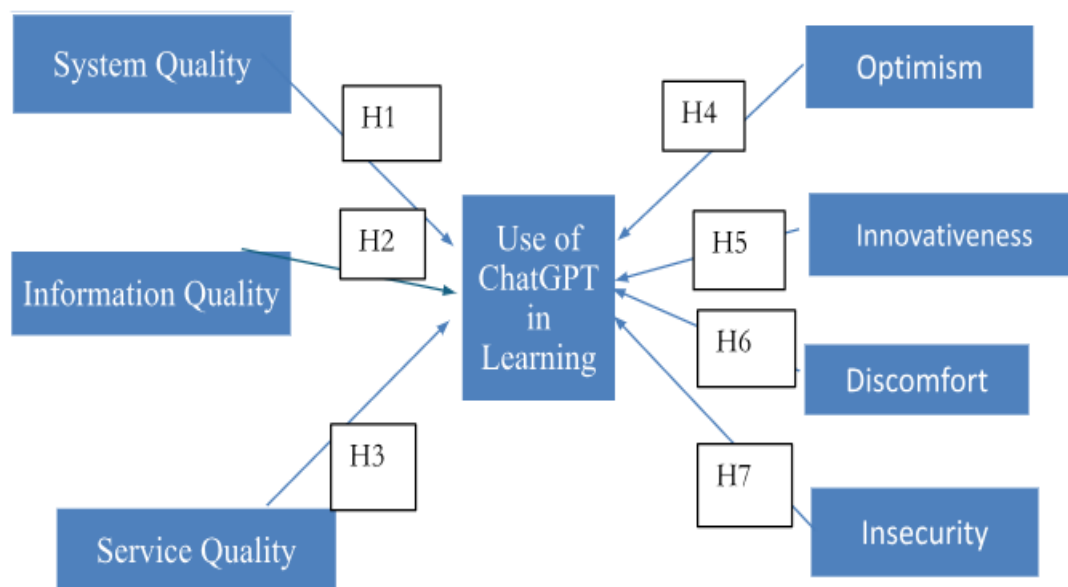


Figure 1. The conceptual research model

### 3. Research method

To understand the impact of proposed hypotheses, the survey method was adopted. An online questionnaire was built. The information about the questionnaire was transferred via LINE. Finally, one hundred and sixty-four valid respondents were gathered. The demographics are shown in Table 1.

Table 1. Gender Distribution

Gender	Number	Percent
Male	77	46.95%
Female	87	53.05%
Total	164	100.00%

#### 4. Data analysis and the results

With limited sample size, the study adopted SmartPLS for data analysis (Ringle et al., 2024).

##### 4.1 Factor loadings, reliability, and validity analysis in questionnaire design

###### 4.1.1 Factor loadings

Factor loadings are critical indicators for assessing the appropriateness of questionnaire items. It is recommended that factor loadings exceed 0.4 to ensure that items effectively reflect their corresponding latent constructs. In Table 2, all factor loadings ranged from 0.67 to 0.93, significantly surpassing the recommended threshold. This highlights the validity and reliability of the selected items, providing a solid reference for future research.

###### 4.1.2 Reliability

In terms of reliability, the composite reliability (CR) values in this study ranged from 0.87 to 0.94, indicating a high level of internal consistency. According to Vinzi et al. (2010), composite reliability should exceed 0.7. The results of this study clearly meet this criterion, demonstrating that the questionnaire reliably measures the intended constructs.

###### 4.1.3 Convergent validity

Regarding convergent validity, the average variance extracted (AVE) values calculated in this study were all greater than 0.5. This finding suggests that the measurement tools used in this study exhibit good convergent validity, effectively capturing the core characteristics of the latent constructs.

In summary, the analysis of factor loadings, composite reliability, and average variance extracted in this study demonstrates that the questionnaire possesses excellent measurement properties. These results provide a robust foundation for subsequent research.

Table 2. Factor loadings, CR, and AVE

Construct	Items	Factor Loading	CR	AVE
System Quality (SYQ)	SYQ1	0.79	0.89	0.62
	SYQ2	0.75		
	SYQ3	0.75		
	SYQ4	0.84		
	SYQ5	0.79		
Information Quality (IQ)	IQ1	0.76	0.90	0.63
	IQ2	0.77		
	IQ3	0.80		
	IQ4	0.81		
	IQ5	0.84		
Service Quality	SVQ1	0.81		
	SVQ2	0.76		

<b>(SVQ)</b>	SVQ3	0.89	0.90	0.70
	SVQ4	0.87		
<b>Insecurity (INS)</b>	INS1	0.83	0.88	0.64
	INS2	0.82		
	INS3	0.78		
	INS4	0.77		
<b>Discomfort (DIS)</b>	DIS1	0.77	0.87	0.57
	DIS2	0.82		
	DIS3	0.77		
	DIS4	0.75		
	DIS5	0.67		
<b>Innovativeness (INN)</b>	INN1	0.70	0.88	0.59
	INN2	0.81		
	INN3	0.68		
	INN4	0.87		
	INN5	0.77		
<b>Optimism (OPT)</b>	OPT1	0.84	0.92	0.69
	OPT2	0.82		
	OPT3	0.82		
	OPT4	0.83		
	OPT5	0.84		
<b>Use (USE)</b>	USE1	0.90	0.94	0.80
	USE2	0.93		
	USE3	0.92		
	USE4	0.82		

About discriminant validity, the results in Table 3 show that the square-roots of AVE are higher than the correlations with other construct. Only the correlation of system quality and service quality is higher. Generally speaking, the results show adequate discriminant validity.

Table 3. Discriminant validity

	DIS	IQ	INN	OPT	SYQ	SVQ	INS	USE
DIS	0.75							
IQ	0.49	0.79						
INN	0.57	0.63	0.77					
OPT	0.47	0.74	0.74	0.83				
SYQ	0.48	0.81	0.50	0.64	0.79			
SVQ	0.44	0.76	0.57	0.73	0.96	0.84		
INS	0.72	0.25	0.43	0.40	0.26	0.35	0.80	
USE	0.47	0.69	0.70	0.75	0.54	0.53	0.30	0.89

The results in Figure 2 show that information quality significantly increases junior high school students' use of ChatGPT in learning, but system quality and service quality do not. Therefore, the hypothesis of H2 is supported, but H1 and H3 are not. In addition, optimism and innovativeness also significantly increases junior high school students' use of ChatGPT in learning, but insecurity and discomfort do not. Therefore, the hypotheses of H5 and H6 are supported, but H7 and H8 are not.

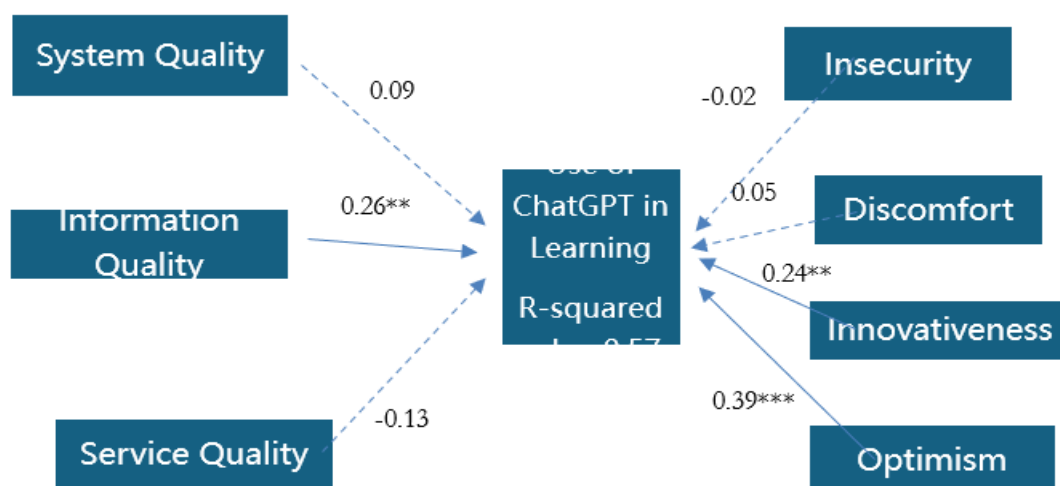


Figure 2. The results of the study

## 5. Discussion and Conclusion

The study investigates junior high school students' use of ChatGPT in learning based on the IS Success Model and the technology readiness index. The results show the importance of information quality in junior high school students' use of ChatGPT in learning. With good information quality, junior high school students access ChatGPT in their learning. Furthermore, their optimism and innovativeness lead to their use of ChatGPT in learning, too. Optimism and Innovativeness are enablers that drive junior high school students' adoption of ChatGPT in learning (Parasuraman, 2000).

ChatGPT is a relatively new technology. This study understands junior high school students' use of ChatGPT in learning based on the IS Success Model and the technology readiness index. The study facilitates understanding junior high school students' use of ChatGPT in learning. They use ChatGPT in learning not only due to the quality of ChatGPT, but also their readiness to adopt the technology. The results facilitate the provision of references for junior high school student education. The study also provides references for teachers' teaching.

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