

APPLICATION OF TECHNOLOGY ACCEPTANCE MODEL ON CHATGPT BY STUDENTS OF HIGHER EDUCATION IN BANGLADESH

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Abstract

This study examines the factors influencing Bangladeshi university students' acceptance of ChatGPT for educational purposes using the Technology Acceptance Model (TAM). Understanding students' acceptance of these technologies is especially crucial in developing nations, given the growing integration of AI-based tools in higher education. Convenience sampling was used to gather primary data since it made it possible to reach respondents who were willing and able to participate. Data was collected from 277 students via an online survey and analyzed using Structural Equation Modeling (PLS-SEM). A systematic survey instrument with two primary components was used to collect data. While the second segment contained five-point Likert-scale items intended to measure the main TAM dimensions, the first section recorded the demographics of the respondents. The results confirm that Perceived Usefulness (PU) ($\beta=0.437, p<.000$) and Perceived Ease of Use (PEU) ($\beta=0.583, p<.000$) significantly influence Attitude (AT), which in turn strongly predicts Behavioral Intention (BI) ($\beta=0.817, p<.000$). Additionally, attitude was shown to be a powerful predictor BI, underscoring its mediating function in the model. The study extends TAM to a developing country context, highlighting the heightened importance of PEU in resource-constrained educational settings.

Keywords: ChatGPT, University, TAM, PLS-SEM, Bangladesh.

1. Introduction

In the past few years, artificial intelligence (AI) has swept through higher education in ways that few would have predicted a decade ago. It's transforming how students learn and communicate and how they make sense of the world around them. Beyond the traditional lectures and textbooks, AI based systems are now providing interactive learning support, online tutoring, and personalized instruction tailored to individual students. Out of all the recent tools that we see, ChatGPT, a language model built by OpenAI, is gaining an unusual amount of interest. It can answer questions in English, simplify challenging subjects, and interact with users (Rudolph

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et al., 2023; Foroughi et al., 2023). For learners, it means they can ask questions, try things out, and refine understanding in a continuous conversation rather than having to scroll through pages of information (Chan et al., 2023).

And the ascent of ChatGPT in education reflects a larger trend in the way students are learning through technology. Although some research indicates that students nowadays use the tool for writing essays, reading comprehension summary, brainstorming and time management of exercises (Jishnu et al., 2023; Leelavathi & Surendhranatha, 2024). These habits imply that students are not simply receiving knowledge, but taking an active part in knowledge co-creation, assisted by AI. But the increasing excitement is tinged with unease. Over-reliance, diminished critical thinking and ethical issues concerning originality are all concerns for educators currently (Rudolph et al., 2023). Therefore, the critical research question is not whether students use ChatGPT, but why they choose to adopt it and how they integrate it into their learning practices.

The emergence of ChatGPT, AI language tool, has prompted a growing body of research on how students in higher education adopt and use such technology for academic purposes. Among the theoretical frameworks applied, the Technology Acceptance Model (TAM) remains dominant due to its strong explanatory power in understanding user acceptance of digital systems (Woithe and Filipec, 2023). TAM posits that individuals' intention to use a technology is primarily determined perceived usefulness (PU) and perceived ease of use (PEU). According to TAM, both PU and PEU directly influence users' attitudes toward using technology, which in turn affects their behavioral intention and actual system use (Davis, 1989).

The TAM has been used in a number of worldwide research to investigate these issues (Şik et al., 2023; Foroughi et al., 2023), but evidence from underdeveloped nations is still conspicuously lacking. Because educational systems in such settings deal with particular circumstances, this disparity is crucial. For instance, huge class numbers, a lack of digital resources, and disparities in students' digital proficiency are common problems at Bangladeshi colleges. There is also persistent concern; many worry that AI will someday take the role of human educators or diminish the value of professional knowledge (Tamzid, 2021). Due to these factors, Bangladeshi students' perceptions and adoption of ChatGPT may differ from those of students in more developed countries.

ChatGPT is being widely used in Bangladeshi universities as well, but research on this front is fragmented. Some early research has investigated user experience (Naher et al., 2023; Karu & Hoque, 2024) and academic performance (Tanvir et al., 2023), however we lack a low level understanding of the psychological determinants that will provide an explanation for students' acceptance behavior toward the tool. To date, no empirical study has systematically applied the TAM to examine the psychological determinants of ChatGPT adoption among university students in Bangladesh, leaving a critical void in our understanding of AI acceptance in this context. Thus, the research look forward to answer the following questions:

- To what extent do PU and PEU predict Bangladeshi university students' attitudes toward ChatGPT?

- How does attitude mediate the relationship between these perceptions and the behavioral intention to use ChatGPT?

By analyzing Bangladeshi university students' adoption of ChatGPT as a learning tool, this study aims to close that gap. It examines how students' opinions of technology's utility and usability affect their attitudes toward it and how these attitudes translate into behavioral intents to embrace it using Davis' TAM (1986, 1989a, 1989b). The study extends TAM to a growing educational environment by anchoring the analysis in the Bangladeshi context. It also provides useful insights for educators, policymakers, and system designers who want to appropriately include generative AI technologies into university instruction and knowledge.

2. Literature Review and Hypothesis Development

2.1 ChatGPT

The advent of AI-powered chatbots into modern education has significantly altered how students interact with one another in the classroom, in addition to the expanding use of technology in traditional teaching methods (Leelavathi & Surendhranatha, 2024). Software applications that manage user-generated input to simulate human conversations are known as chatbots. A complex AI language model called ChatGPT was introduced by OpenAI in 2019 (Thorp, 2023; Lund & Wang, 2023). ChatGPT uses deep learning techniques based on transformer architecture to comprehend natural language queries and produce responses that resemble those of a human (Lund & Wang, 2023). Since its first release in 2019, OpenAI has made many upgrades, including GPT-3, GPT-4, and maybe GPT-5, all of which provide improved natural language processing capabilities (Thorp, 2023; Islam & Tamzid, 2023). In addition to text generation, ChatGPT's latest innovations enables for translation, question-answering, computer code analysis, and the creation of original material (Lund & Wang, 2023).

2.2 Technology Acceptance Model (TAM)

One of the most popular frameworks for analyzing users' acceptance and adoption of information technology is the TAM, which was created by Davis in 1989. based on Fishbein and Ajzen's 1975 Theory of Reasoned Action (Nickerson, 2023). According to TAM, PU and PEU have a major impact on consumers' behavioral intention to utilize technology. According to TAM, PEU influences both perceived utility and attitude, whereas PU directly influences users' attitudes toward technology usage and consequent behavioral intentions (Davis, 1989). The model has demonstrated great explanatory power in predicting adoption behavior and has been thoroughly validated in a variety of technical contexts, such as web-based systems, mobile apps, and e-learning platforms (King & He, 2006; Venkatesh & Davis, 2000).

TAM has been extensively used in educational research to examine how well students embrace different digital learning resources. The fundamental TAM is still suitable for the current study for several reasons, even though TAM has several expansions and enhancements. Rather than establishing a full prediction model, the goal of this research is to investigate the characteristics that influence university students' acceptance of ChatGPT for instructional purposes. These aspects are connected to fundamental cognitive concepts underpinning technological adoption. Also, including

all the additional variables like social influence and enabling conditions would make the model more complicated and necessitate much higher sample sizes to guarantee sufficient statistical power. Research indicates that while PEU frequently influences academic engagement and continuous usage behavior, PU continues to be a strong predictor of students' willingness to utilize educational technology (Tarhini et al., 2016). Additionally, to situate TAM within the educational domain, a number of researchers have included dimensions including self-efficacy, enabling circumstances, and attitude toward technology (Alharbi & Drew, 2018).

2.3 Perceived Usefulness (PU), Perceived Ease of Use (PEU), and Attitude

The TAM developed by Davis (1986, 1989a, 1989b) posits that user adoption of new technologies is primarily influenced by PU and PEU. PU refers to the degree to which individuals believe that using technology enhances their execution, while PEU denotes the extent to which a system is free of effort. Prior studies confirm that both factors directly affect user attitudes toward new technologies and are strong predictors of acceptance (Dishaw & Strong, 1999; Taylor & Todd, 1995).

When it comes to AI-powered conversational systems like ChatGPT, PU can take several forms, such as enhanced conceptual comprehension, quicker access to explanations, help with academic writing, and prompt response to inquiries (Almulla, 2024). Also, TAM forecasts that positive attitudes regarding the usage of such a technology will develop when students believe it improves learning efficiency without demanding a significant amount of technical or cognitive work. However, the salience of these beliefs must be interpreted within the specific institutional and cultural context. In many Bangladeshi universities, large class sizes, high student-teacher ratios, and limited opportunities for individualized academic support constrain personalized learning experiences. Given these structural realities, the practical benefit (PU) of a 24/7 accessible, on-demand academic assistant like ChatGPT is likely to be particularly pronounced. Personalized learning experiences are constrained by high student-teacher ratios, big class sizes, and few options for specialized academic help (Bingham et. al., 2018). In the case of ChatGPT, students' positive evaluations of its practical benefits and usability are therefore expected to foster favorable attitudes. Based on these, following hypothesis can be proposed

H1a: *Perceived usefulness (PU) will positively influence students' attitudes toward ChatGPT.*

H1b: *Perceived ease of use (PEU) will positively influence students' attitudes toward ChatGPT.*

2.4 Attitude and Behavioral Intention

Technology adoption studies have frequently highlighted the relationship between attitude (AT) and behavioral intention (BI). According to Perugini and Bagozzi (2001), attitude is a person's favorable or negative assessment of a technology, which in turn affects their desire to interact with it. Additionally, Leone et al. (2004) contend that attitudes increase behavioral intentions by fostering hope. Positive attitudes have been proven to boost user intentions in a variety of technologies, including drone-based food delivery services, according to empirical study (Hwang et al., 2019).

According to this logic, students who have positive attitudes on ChatGPT are more likely to show a strong desire to utilize it frequently in academic settings. Consequently, the following hypothesis has been formulated.

H2: *Attitude toward ChatGPT will positively influence students' behavioral intention (BI) to use the platform.*

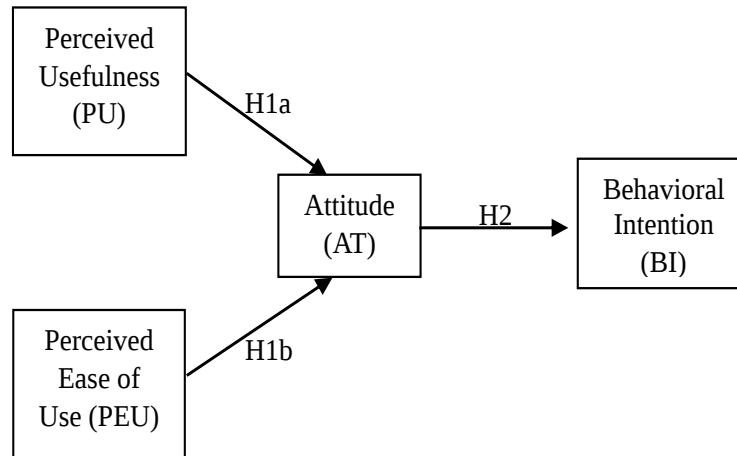


Figure 1: Conceptual framework

3. Methodology

3.1 Measurement

Each of the four main components of the study model was evaluated using many items. The majority of the chosen measuring items were modified from earlier research to guarantee validity. The Appendix contains the questionnaire that has been modified to fit the setting of the study. The measures used to evaluate the fundamental components of the Technology Acceptance Model (TAM), such as perceived utility (PU), perceived ease of use (PEU), attitude, and behavioral intention (BI), were modified based on Song et al. (2021). A 5-point Likert scale was used to measure every variable in the research. PU, PEU, AT, and BI scale adopted from Weng et. al. (2018) (see appendix). Items related to AT include “Using multimedia material in class is good”. BI items include “I tend to use using multimedia materials in my class”. PU items include “Using the multimedia material in my class helps me to control the pedagogy” and PEU include “It is easy to become skillful at using multimedia materials.”

3.2 Data Collection and Analysis

The research population consisted of university students residing in Bangladesh, with data collected from 277 valid responses. Convenience sampling was employed to collect the data for this study. This sampling technique was chosen because it is widely used in quantitative research and is particularly suitable when participants from the target population are easily accessible, geographically proximate, available within a specific timeframe, and willing to take part in the study (Rita & Islam, 2024). Data was collected via an online survey operated using Google Forms.

Research suggests that a sample size exceeding 150 meets the fundamental statistical requirements for hypothesis testing using Structural Equation Modeling (SEM) (Hair et al., 2010). Hair et al. (2010) also recommended collecting data from 5 to 10 times the number of scale items for a robust study assessment. This study includes 14 items across four constructs and applies SEM methodology. In the fields of social sciences and management, researchers frequently utilize Partial Least Squares (PLS) as a variance-based SEM technique (Nitzl et al., 2016).

Table 1: Respondents' profile

Demography	Frequency	Percentage
Gender		
Male	159	57.4%
Female	188	42.6%
University Type		
Private	184	66%
Public	93	34%
Usage		
Daily	85	31%
2-3 times a week	55	20%
Once a week	100	36%
A few times a month	37	13%

Source: Compiled by author

4. Result

4.1 Reliability and Validity

Reliability and validity indices, as well as the factor loading extra items, are shown in Table II. As shown in Table 2, all constructs demonstrated high internal consistency, with Cronbach's Alpha and Composite Reliability (ρ_a and ρ_c) values exceeding the recommended threshold of 0.70. According to Sarstedt et al. (2017), these values were in the region between Cronbach's Alpha and CR (ρ_c). Fornell and Larcker (1981) suggest a minimal Average Variance Extracted (AVE) criterion of 0.500 in order to demonstrate convergent validity. This study's implicit variables all had AVE values more than 0.5, indicating a satisfactory degree of convergent validity.

Table 2: Item loadings, reliability and convergent validity

Construct	Items	Loading	Cronbach's alpha	Composite reliability (ρ_a)	Composite reliability (ρ_c)	Average variance extracted (AVE)
AT	AT1	0.903	0.891	0.916	0.931	0.769
	AT2	0.869				

	AT3	0.815				
	AT4	0.862				
BI	BI1	0.893	0.837	0.867	0.901	0.706
	BI2	0.917				
	BI3	0.778				
PEU	PEU1	0.889	0.887	0.913	0.935	0.729
	PEU2	0.867				
	PEU3	0.831				
	PEU4	0.892				
PU	PU1	0.798	0.854	0.872	0.913	0.760
	PU2	0.912				
	PU3	0.867				

Source: Author's calculation

Discriminant validity is established when the square root of the AVE surpasses the inter-variable correlations (Fornell & Larcker, 1981). Throughout the analysis, as shown in Table 3, the square root of the AVE for AT (0.877) is greater than its correlation with BI (0.803), PEU (0.836), and PU (0.843), thus confirming discriminant validity.

Table 3: Discriminant validity (Fornell and Larcker Criterion)

	AT	BI	PEU	PU
AT	0.877			
BI	0.803	0.840		
PEU	0.836	0.773	0.854	
PU	0.843	0.758	0.823	0.872

Source: Author's calculation

4.2 Structural Model

There are both strong and weak correlations between the variables under investigation, according to the findings of the hypothesis testing shown in Table IV. With a beta value of 0.437 and a t-score of 9.230 at a significance level of $p = 0.000$, PU significantly influenced attitude (AT). In a similar vein, AT was affected by perceived ease of use (PEU) ($\beta = 0.583$; $t = 9.980$; $p = 0.000$). Furthermore, statistical analysis revealed that AT was a significant predictor of behavioral intention (BI) ($\beta = 0.817$; $t = 30.939$; $p = 0.000$). These conclusions are consistent with earlier research by Song et al. (2021) and Yilmaz et al. (2023). The study verified a number of significant associations and showed links between the dimensions in the proposed model.

Table 4: Structural model outcomes

Hypothesis	Relationship	Path Coefficient (β)	Standard Deviation (SD)	t-value	p-value	Decision
H1a	PU $\rightarrow$ AT	0.437	0.045	9.230	0.000	Supported
H1b	PEU $\rightarrow$ AT	0.583	0.047	9.980	0.000	Supported
H2	AT $\rightarrow$ BI	0.817	0.023	30.939	0.000	Supported

Source: Author's calculation

This study looks at how Bangladeshi university students use ChatGPT for learning, providing insightful information about how contextual and functional aspects affect adoption. The results show that students' good attitudes are reinforced by positive views of technology, with PU (PU) having a substantial influence on AT. Furthermore, students' receptiveness is further improved by Perceived Ease of Use (PEU), which leads to a more favorable AT. Additionally, the study shows that students have a significant behavioral intention to use ChatGPT, indicating a high chance of adoption when they have favorable attitudes about the technology.

5. Discussion

The results of this study support the applicability of the TAM in elucidating the adoption of ChatGPT by college students, particularly in developing nations like Bangladesh. Students' attitudes toward the tool were shown to be strongly impacted by both PU and PEU, and these attitudes in turn had a substantial impact on their desire to keep using the tool. These findings align with Davis's seminal work (1989a, 1989b) and are compatible with research done in more technologically sophisticated settings (Yilmaz et al., 2023; Foroughi et al., 2023).

However, this study stands out due to its contextual foundation. It shows that the connections suggested by TAM also apply in a setting where institutional preparedness, infrastructure, and digital literacy differ greatly—a fact that is frequently disregarded in mainstream technology adoption studies. The significant impact of PEU on students' opinions is one of the most startling findings. The stronger effect of PEU ($\beta=0.583$) compared to PU ($\beta=0.437$) on AT suggests that in the Bangladeshi context, usability is a more critical initial hurdle for adoption than perceived usefulness. Ma et. al. (2025) found a similar result from a study in China that indicates both PU and PEU affect the readiness of students to use ChatGPT. Additionally, Almogren et. al., (2024) found that attitudes towards use and behavioral intentions were significantly proved for the actual adoption of ChatGPT. Thus, for students facing erratic internet and limited digital resources, an easy-to-use interface is not just a luxury, but a necessity for overcoming barriers to entry.

In these situations, user-friendly and intuitive technology are viewed as freeing rather than frightening. This demand is nicely served by ChatGPT's conversational interface, which doesn't require complicated setup or specialist expertise. This result validates Davis's (1986) claim that usability lessens psychological resistance to innovation, but it also expands on the notion, implying that in educational settings

with limited resources, usability can wind up being the most important element in deciding adoption.

Students' opinions were also found to be significantly influenced by PU. Many participants seem to see ChatGPT as a useful study aid that improves learning effectiveness, saves time, and enables them to better manage academic expectations. These advantages are especially valuable in Bangladesh, where big class sizes and little teacher-student interaction are typical. By offering quick, tailored feedback something that students frequently find difficult to obtain in conventional classrooms ChatGPT closes a gap. This supports the claim stated by Leelavathi and Surendhranatha (2024) that the perceived capacity of educational technology to get over structural or resource-related obstacles is often what propels their acceptance.

The emotional aspect of technology acceptance is shown by the clear and substantial relationship between attitude and behavioral intention. Students are more likely to use ChatGPT often as part of their learning process rather than merely as a tool if they find it entertaining or engaging. Perugini and Bagozzi (2001), who emphasize that emotional and motivational elements bridge the gap between belief and conduct, share this viewpoint. In this instance, using ChatGPT demonstrates students' interest, contentment, and sense of empowerment that results from learning new digital technologies in addition to being a logical choice.

When taken as a whole, these results show how environmental and psychological elements interact to influence technology adoption in higher education. They demonstrate that although the basic logic of TAM is still true, the relative significance of its constructs can change based on the setting's infrastructure and sociocultural factors. Enhancing usability and showcasing real learning advantages could have a greater impact on Bangladesh and other poor countries than focusing on novelty or sophisticated features.

From a wider angle, this study emphasizes how AI-powered systems like ChatGPT are revolutionizing higher education. However, it also necessitates careful execution. Universities should make sure that the introduction of AI tools enhances rather than replaces ethical learning methods, creativity, and critical thinking. To make sure that students use these tools appropriately, it will be crucial to set institutional norms, promote thoughtful use, and build digital literacy. Teachers and legislators may strive toward a learning environment that is inclusive, flexible, and in line with the changing digital future of education by acknowledging ChatGPT's potential as well as its difficulties.

6. Implications

The findings have both theoretical and practical implications. This study contributes to theory by validating TAM in a novel, resource- constrained context, demonstrating that the model's predictive power holds, but the relative importance of its constructs (specifically PEU) is context-dependent. Despite the fact that TAM has been used frequently in Western contexts, the current results demonstrate that attitude, PU, and perceived ease of use are the primary factors impacting intention among Bangladeshi students. This demonstrates that TAM is still a useful lens that can be used to a

variety of technology usage scenarios and provides a relative explanation for students' adoption of new AI-powered tools in technologically and institutionally driven situations.

As a matter of fact, the results validate the most crucial aspects of adoption. Students are more likely to use ChatGPT if they think it's easy to use and beneficial for learning. For colleges with varying degrees of digital awareness and resources, streamlining the interface and demonstrating its academic value may be equally as important as improving technology infrastructure. Finally, the research has implications for policy and institutional practice. Since attitudes have a big impact on intention, universities need to not only make ChatGPT available but also foster a favorable environment surrounding its use. Responsible adoption may be encouraged via awareness, ethics, and training programs. Legislators find it challenging to portray AI in education as a complement that enhances student engagement rather than as a replacement for traditional learning in environments where large class sizes and limited resources are still common.

7. Recommendations

A number of recommendations are offered for academic institutions, educators, politicians, and technologists in light of these findings. Colleges may start doing this by systematically integrating ChatGPT into their programs.

- Institutions can make more formal use of ChatGPT's powerful capabilities by assigning or mandating projects that use the platform under supervision, as opposed to depending on it unsupervised. In this manner, ChatGPT may help students in a way that complies with academic ethics.
- At the same time, specialized training for teachers and students should be developed to encourage ethical and responsible use. By educating users on ChatGPT's capabilities as well as its limitations, these initiatives would reduce the possibility of abuse or overconfidence. Infrastructure support also has to be taken into consideration. Internet penetration and unequal access to digital tools continue to be obstacles for many Bangladeshi students, especially those who reside outside of large cities.
- Investing in dependable internet and campus infrastructure would promote parity in the use of AI-powered technologies. At the same time, I think lawmakers need to set clear guidelines for the application of AI in higher education. These rules, which place more emphasis on usage than limitation, should encourage development and protect the norms of creativity, ingenuity, and critical thinking.
- Finally, ChatGPT's local relevance might be improved by platform providers and developers. If the website offers dual language help, curriculum-specific solutions, and culturally relevant apps, students could find it more relevant. Combining these steps would optimize ChatGPT's educational potential and solve the problems related to new technologies, guaranteeing that it is both accessible and appropriately integrated into the system of higher education.

8. Conclusion

This study uses the TAM to investigate ChatGPT's acceptability among Bangladeshi university students. The findings show that PSII is a powerful predictor of attitudes and that attitudes have a major impact on behavioral intention to keep using the instrument. This result validates the hypothesis that the relationship between perceived usability and functionality and actual adoption is mediated by attitude.

The study's contribution is to place this well-known concept in the context of Bangladeshi higher education, where there is still unequal integration of cutting-edge technology. The study adds to the body of knowledge on educational technology adoption and shows that TAM is still very important for comprehending AI-driven learning aids in underdeveloped nations by emphasizing how students in a resource-constrained context assess ChatGPT.

According to the study's findings, ChatGPT has a lot of potential as a learning tool in Bangladesh as long as students find it practical and user-friendly. To ensure that new technology improves rather than detracts from the educational experience, it will be essential to foster favorable attitudes toward the platform through supporting policies, efficient training, and careful integration into instruction.

9. Limitations and Future Research

There are several limits to the research. Although sufficient for analysis, the sample may not accurately reflect the variety of Bangladeshi institutions, and the cross-sectional methodology fails to capture shifts in student opinions over time. Therefore, longitudinal methods should be used in future research to track changing adoption trends, broaden the sample to include more institutions, and take into account comparison studies across various national or cultural settings. These methods would offer a deeper comprehension of how students' acceptance of AI changes as technology advances.

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Appendix

Perceived Usefulness (PU)

- Q1. Using the multimedia material in my class helps me to control the pedagogy.
- Q2. Using the multimedia material in my class enhances the teaching performance.
- Q3. I find the multimedia material useful in my class.
- Q4. Using multimedia materials makes it easier to catch individual students' needs.

Perceived Ease of Use (PEU)

- Q5. It is easy to become skillful at using multimedia materials.
- Q6. I find it easy to apply the multimedia material in my class.
- Q7. Using multimedia materials is easy and understandable.
- Q8. Using multimedia materials is more flexible to teach than traditional one.

Attitude (AT)

- Q9. Using multimedia material in class is good.
- Q10. My using multimedia material in class is favorable.
- Q11. It is a positive influence for me to use multimedia material in class.
- Q12. I think it is valuable to use multimedia material in class.
- Q13. I think it is a trend to use multimedia material in class.

Behavioral Intention (BI)

- Q14. I tend to use using multimedia materials in my class.
- Q15. I increase the occurrences of using multimedia materials in class.
- Q16. Using multimedia materials in my class to enhance students' learning interest.
- Q17. I'd love to use multimedia materials in my class.
- Q18. I use multimedia materials to provide multi-approaches on teaching.