



# Academicians' Acceptance of Online Learning Environments: A Review of Information System Theories and Models

By Asanka Gunasinghe, Junainah Abd Hamid, Ali Khatibi  
& SM Ferdous Azam

*Management & Science University*

**Abstract-** Aim of this paper is to review technology (IS) acceptance theories and models, recognizing empirical evidence available to support the suitability of each theoretical model in explaining academicians' acceptance of online learning technology. Understanding the factors influencing system usage is crucial for decision-makers to recognize potential user needs and concerns, which could be addressed during the development phase of a system. Thus, for decades, researchers have been trying to understand why people accept new technologies. As a result, a wide variety of theories and models explaining the concept of technology acceptance. Some prominent theoretical models explaining technology acceptance are, "Theory of Reasoned Action", "Diffusion of Innovation theory", "Theory of Planned Behavior", "Social Cognitive Theory", "Technology Acceptance Model", "Model of PC Utilization", "Motivational Model", "Unified Theory of Acceptance and Use of Technology", "UTAUT 2", "UTAUT 3". The concept of academic's acceptance of online learning technology can be explained through several determinants that are operationalized through above information systems models.

*GJCST-H Classification: H.3.5*



*Strictly as per the compliance and regulations of:*



# Academicians' Acceptance of Online Learning Environments: A Review of Information System Theories and Models

Asanka Gunasinghe<sup>α</sup>, Junainah Abd Hamid<sup>σ</sup>, Ali Khatibi<sup>ρ</sup> & SM Ferdous Azam<sup>ω</sup>

**Abstract-** Aim of this paper is to review technology (IS) acceptance theories and models, recognizing empirical evidence available to support the suitability of each theoretical model in explaining academicians' acceptance of online learning technology. Understanding the factors influencing system usage is crucial for decision-makers to recognize potential user needs and concerns, which could be addressed during the development phase of a system. Thus, for decades, researchers have been trying to understand why people accept new technologies. As a result, a wide variety of theories and models explaining the concept of technology acceptance. Some prominent theoretical models explaining technology acceptance are, "Theory of Reasoned Action", "Diffusion of Innovation theory", "Theory of Planned Behavior", "Social Cognitive Theory", "Technology Acceptance Model", "Model of PC Utilization", "Motivational Model", "Unified Theory of Acceptance and Use of Technology", "UTAUT 2", "UTAUT 3". The concept of academic's acceptance of online learning technology can be explained through several determinants that are operationalized through above information systems models. Since past studies have suggested the importance of academicians' acceptance of online learning technology, this paper would be useful for studies having a similar scope.

## I. INTRODUCTION

Academic acceptance of online learning environment is a topical research trend in the information system (IS) acceptance domain (Mirzajani, Mahmud, Fauzi Mohd Ayub, & Wong, 2016). In IS literature, the online learning environment is also referred to as a virtual learning environment, eLearning technology, Learning management system, or Content management system (Phungsuk, Viriyavejakul, & Ratanalarn, 2017). The online learning environment is a web-based system using multimedia enabling anytime, anywhere access to educators and learners (Ma, Han, Yang, & Cheng, 2015). Online learning assists academicians in efficacious conduct of courses while providing students with enhanced learning experience (Poon, 2013). The popularity of online learning has resulted in an upsurge in studies that scrutinize its role within higher educational settings (Annetta, Folta, & Klesath, 2010). Some of these studies were keen on analyzing the acceptance of online

educational technologies within the higher educational (HE) institutions. Other studies either focused on the use of eLearning for teaching and learning purposes and its effect on the educational outcomes of teachers and students or concentrated on examining the factors affecting teachers or students in accepting online learning technology in the higher educational (HE) institutes.

### a) *Technology Acceptance*

In general, "acceptance" refers to the consenting action of an individual to receive what is being offered (Taherdoost, 2018). The term "technology acceptance" denotes the initial optimistic decision of an individual to use a technological innovation (Dillon, 2001). User acceptance is crucial for the growth and proliferation of any new technology (Bano & Zowghi, 2015). Besides, the term "acceptance" is an indication of user involvement in systems development (Bano & Zowghi, 2015). If policy makers understand the factors influencing system usage, user concerns can be addressed during the development phase of a system (Taherdoost, 2018). Similarly, practitioners in IS field have been looking to answer this question to better the designs of systems they develop, in response to the demands of new users. For decades scholars have been attempting to understand why people accept new technologies resulting in a wide variety of theories and models explaining the concept of technology acceptance (Lai, 2017).

### b) *Overview of Technology (IS) Acceptance theories*

Technology acceptance models and theories have been useful in understanding user acceptance of various technologies in a wide variety of system domain. Acceptance studies are common in the fields of health, education, mobile technology, and consumer purchase behavior. Several technology acceptance models have been developed by various scholars, and each of these models explains acceptances of new technologies through numerous factors identified and validated with empirical evidence. Some prominent theories explaining technology acceptance are, Theory of Reasoned Action (Fishbein & Ajzen, 1975), Diffusion of Innovation theory (Rogers, 1983), Theory of Planned Behavior (Ajzen, 1985),

Author <sup>α</sup> <sup>σ</sup> <sup>ρ</sup> <sup>ω</sup>: Management & Science University, Malaysia.  
e-mail: asankhaa.gunasinghe@gmail.com

Social Cognitive Theory (Bandura, 1986), Technology Acceptance Model (Davis, 1986, 1989; Davis, Bagozzi, & Warshaw, 1989), Model of PC Utilization (Thompson, Higgins, & Howell, 1991), Motivational Model (Davis, Bagozzi, & Warshaw, 1992), Unified Theory of Acceptance and Use of Technology-1 (Venkatesh, Morris, Davis, & Davis, 2003), UTAUT-2 (Venkatesh, Thong, & Xu, 2012), UTAUT-3 (Farooq et al., 2017). These theories/models are mostly refined or extended or combined and applied to study user acceptance of technology in different domains.

c) *Academicians acceptance of technology*

The user adoption precedes the effective implementation of that (Al-Emran, Mezhyuev, & Kamaludin, 2018). Similarly, user resistance toward any new technology costs more time, money, and effort resulting in a loss of benefits attached to the technology (Davis et al., 1989). Past studies suggest the importance of academics' acceptance of online learning technology in higher educational (HE) institutions. Further, the field of research that focused on factors affecting eLearning acceptance is still in the initial phase that needs to be examined from different perspectives (Holsapple & Lee-Post, 2006; Nanayakkara & Kusumsiri, 2013). Some determinants academic's acceptance of online learning

Road map of the IS acceptance theory development is presented in figure 1.

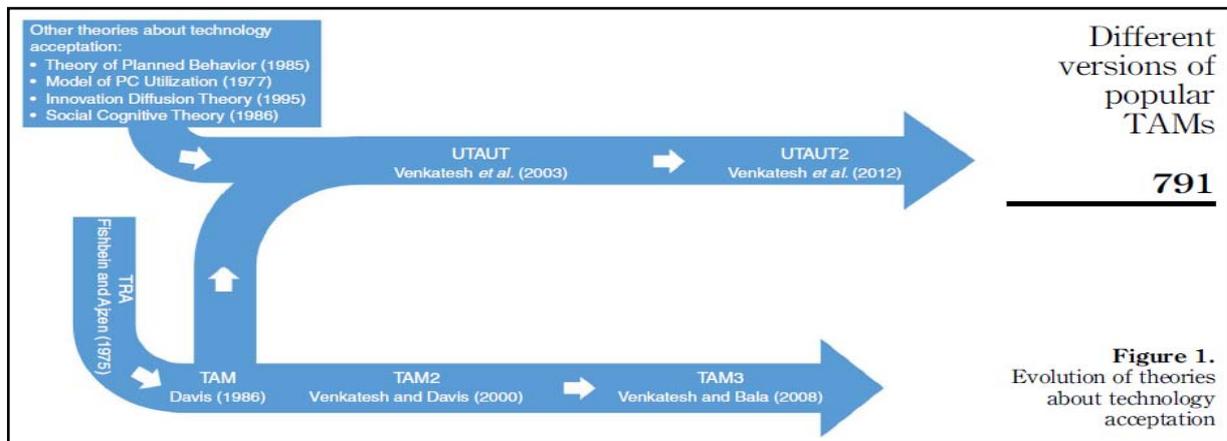


Figure 1: Development of Theories of Technology Acceptance

a) *Theory of Reasoned Action (TRA)*

TRA was initially developed by Fishbein and Ajzen (1975) for sociological and psychological studies. According to Teo (2013) TRA is the best model to explain teacher's technology acceptance. Few studies have employed TRA as the base theory to explain academic technology acceptance (Johnson & Ma, 1999; Rizzo & Kirkendall, 1995). However, scanty of the literature suggests that TRA was not a popular theory in predicting IS system adoption of academics. In this model, three cognitive components collectively explain technology acceptance behavior of humans. They are, attitude (favorable or unfavorable feeling to act in a certain manner), social norms, (social influence to

technology have been operationalized using educational theories, while other predictors have been captured through other information systems (IS) acceptance models (Taherdoost, 2018). However, determining an appropriate theoretical framework that can best explain academic's acceptance of online technology is not an easy task. On the assumption that an IS acceptance models could support to develop a theoretical framework to best describe academic's acceptance of technology in the HE context, technology acceptance theories and models are critically reviewed in this study, considering the empirical evidence available to support the suitability of each theory in the study context.

II. A CRITICAL REVIEW OF IS ACCEPTANCE THEORIES

It is felt essential to assess each theory independently to understand their appropriateness in explaining academic's acceptance of online learning environments. For this purpose, this paper presents a critical theoretical, and empirical assessment of each prominent theory and its applications in academic's IS acceptance.

behave in a particular manner) and behavioral intention (individual's cognitive decision in behaving in a particular method). Moreover, TRA suggests that human behavior is rational, systematic, and volitional. Therefore, TRA is evaluated through the measurement of boundary factors such as volition or will, intention stability over time, and intention. These factors are tested against variables such as time horizon, action, target, specificity and the study context. TRA does not address the effects of habit, ignoring moral factors and cognitive deliberation in predicting technology acceptance, which is the main weakness of this theory. Additionally, usage voluntariness is a critical issue in TRA validation.

### b) *Theory of Planned Behavior (TPB)*

TPB was developed by (Ajzen, 1985). In this model, TRA was extended with a new variable called perceived behavioral control (PBC). In this framework, perceived behavioral control is determined by the resources available, significance of available resources and opportunities and skills available to achieve a behavioral outcome. Similar to TRA, TPB assumes that behavioral intention (BI) affects technology use behavior. However, in TPB, the actions of an individual that are not accounted by volitional control is discussed under perceived behavioral control. Therefore, the introduction of the variable PBC is a key advancement of this model against the limitations excited in TRA. Another benefit of adding a component such as PBC is that it permits adding factors like self-efficacy. TPB model suggests that PBC directly influence the actual behavior, in addition to its indirect effect on actual behavior through behavior intention (BI) to use a particular technology. Thus, in TPB three factors namely perceived behavioral control, subjective norm, and attitude, affect the behavioral intent of an individual which ultimately trigger actual use behavior of technology. However, this model has several problems. Firstly, a favorable attitude to use a system may not be significant in a setting where technology access is an issue. Next, TPB appears more appropriated to explain voluntary use of technology since the outcome behavior can be predicted in the presence of factors affecting individual's voluntariness in technology acceptance behavior. The applicability of TPB in explaining the academic acceptance of the technology was validated by Teo and Beng Lee (2010) and J. Lee, Cerreto, and Lee (2010).

### c) *Theory of Interpersonal Behavior (TIB)*

The theory of Interpersonal Behavior (TIB), focuses on clarifying complexities in human behavior when affected by emotional and social factors (Triandis, 1977). In this model, weaknesses of TRA and TPB is addressed by adding habit, affect, and facilitating conditions in to already available predictors. In this, social factors are elaborated as social roles, social norms and self-concept. According to TIB, human behavior is not completely planned, nor it is automatic; nor it is entirely autonomous or completely social. TIB is different from TRA since it attempts to explain variance in total when TRA explains change in behavior with minimum factors. Scholars supporting TIP argue that even the smallest amount of variance is vital to explain, especially if the behavior in consideration is critical. In this model, behavioral intention is formed by factors such as emotions, habits, and social factors. The TIB claim behavior in three levels. In the first level, beliefs, attitudes, and social factors affecting human behavior is molded by personal characteristics and previous experience. The second level describes how cognitive,

affective, and social factors along with normative beliefs influence intention to use a particular technology. The third level predicts human behavior through behavioral intention, past experience, and situational factors. The complexity of the model is considered as the main weakness, and it lacks parsimony compared to TRA or TPB. Further, TIB does not provide operational definitions for the variables, leaving it to the researcher. The application of TIB in explaining the teacher's acceptance of educational technology is evident in the studies of Misbah, Gulikers, Maulana, and Mulder (2015).

### d) *Technology acceptance model (TAM)*

The TAM (Davis et al., 1989) is derived from the TRA framework; however, due to the unspecified theoretical status of TRA subjective norm was removed from the TAM model. This model explains technology acceptance using three independent factors, namely perceived usefulness, perceived ease of use, and attitude to use technology. According to TAM authors, perceived usefulness, perceived ease of use has a significant impact on attitude. The behavioral intention mediates the relationship between attitude and actual usage. In TAM, all other factors affecting acceptance are encompassed into a single component called an external variable. The external variable could have one or more determinants (i.e., System characteristics, user perceptions, training) other than TAM variables affecting technology acceptance. Perhaps, TAM is the most cited framework in technology acceptance. It has been used by many researchers testing acceptance of vast variety of technologies such as, academic use of online technology (Gibson, Harris, & Colaric, 2008; Teo, Lee, Chai, & Wong, 2009; K.-T. Wong, 2013; Yuen & Ma, 2008); e-banking (Lule, Omwansa, & Waema, 2012); clinical applications (Li, Huang, Xu, Li, & Lu, 2012); consumer technology (Kim & Woo, 2016). As a result, TAM received a considerable amount of empirical support during past few decades suggesting its robustness in technology acceptance. However, TAM does ignore the impact of social influence on technology acceptance. Therefore, critics argue that TAM cannot be used to test technologies outside the workplace. Further, as evident in most empirical studies, high prediction of usage is achieved by adding external variables to the TAM model. Furthermore, TAM does not consider the impact of intrinsic motivation of individual in accepting technology. Therefore, its ability to predict technology adoption in customer contexts is debated by critics, who state that technologies are used by individuals not only to carry out tasks but also to satisfy their emotional needs. Thus, lacking affective components/variables are considered as the main weakness of this model.

#### e) *Extended TAM (ETAM)*

In the ETAM(Venkatesh & Davis, 2000), TAM was extended with new factors. This alteration improved its predictive power, specificity, and adaptability. ETAM studies have gone in two directions. The researches on the first root focus on the precedence of perceived usefulness and behavioral intention. In this, social influence (social image, subjective norm, voluntariness) and cognitive factors (output quality, job relevance, result demonstrability) were added. There this model was outperforming in both mandatory and voluntary environments. The second set of studies focused on studying constructs that influence perceived ease of use. Two groups of antecedence of perceived ease of use have been discussed in these studies. They are adjustments and anchors. Anchors include general beliefs such as "enjoyment" and "objective usability" regarding the use of computer systems. The adjustment set includes direct experience of given system use such as self-efficacy, external control, anxiety, and computer playfulness. ETAM was found in some studies of academic's acceptance of online technology (Fathema, Shannon, & Ross, 2015; Teo, 2009; Waheed & Jam, 2010).

#### f) *Igbaria's Model (IM)*

The IM(Igbaria, Parasuraman, & Baroudi, 1996)explicate that both external and internal motivators influence individuals' technology acceptance decision(Igbaria, Schiffman, & Wieckowski, 1994). This model postulate "perceived enjoyment" as an intrinsic motivator and "perceived usefulness" as an extrinsic motivator which influences "attitude" and "use behavior". Also, the model assumes that pleasure or fun, computer anxiety, computer satisfaction, usefulness directly and indirectly affects technology use. Other relationships highlighted in this model are that perceived usefulness influence perceived enjoyment and computer anxiety has a negative effect on perceived usefulness and enjoyment. An application of IM was found in the study of Teo and Noyes (2011) in examining the use of technology among preservice teachers.

#### g) *Social Cognitive Theory (SCT)*

This theory is inspired by social psychology. In the SCT(Bandura, 1986), acceptance is predicted by integrating a set of personal, behavioral, and environmental factors bi directionally. Therefore, all three factors influence each other in a reciprocated manner. In SCT, the behavior is discussed as an issue on performance, usage, or adoption. In this, personal factors are defined as cognitive and demographic characteristics of a person that portray his or her personality. Environmental factors include aspects in the social and physical environment around the individual. Some variables encompassed in the SCM are Anxiety, self-efficacy, Affect, performance, or outcome expectation. K. T. Wong, Russo, and McDowall (2013)

employed SCT in studying teacher's acceptance of the interactive whiteboard. Anderson, Groulx, and Maninger (2011) validated SCT by studying teacher's technology use in the classroom.

#### h) *Innovations Diffusion Theory (IDT)*

The model IDT(Rogers, 1983) introduces four factors such as time, channels, communication, innovation, and social system that affect the diffusion of innovative technology. IDT framework has been widely used in acceptance studies in individual(Brahier, 2006; Y.-H. Lee, Hsieh, & Hsu, 2011) organizational(Alia & Zainuddin, 2005; Frank, Zhao, & Borman, 2004; Nanayakkara, Kusumsiri, & Perera, 2016) and global contexts(Nahar, Kakola, & Huda, 2002; Zhu, Dong, Xu, & Kraemer, 2006). In IDT, three major components are integrated to predict adoption behavior. They are adopter's characteristics, features of the innovation, and adoption decision process. Adopters are identified in five groups based on their similarities in their adoptive behavioral characteristics, namely, innovators, early adopters, early majority, late majority, and laggards. Features of the innovation are described through factors such as relative advantage, complexity, trialability, compatibility, observability that influence acceptance of any innovative technology.IDT further suggest that innovation adoption process should follow the five-step approach of confirmation, acquired knowledge, decision, execution, and persuasion of the adopter through effective communication for a prolonged period(Rogers, 1983). Compared to other acceptance frameworks, IDT has less power in explaining technology use behavior (outcome), which is the main weakness of this model.

#### i) *Perceived characteristics of Innovating Theory (PCIT)*

This framework extends IDT theory by adding three components namely, innovation characteristics, perceived voluntariness, and actual behavior. The PCIT(Carter & Belanger, 2004) postulate that perceived voluntariness, and innovation characteristics effect the actual behavior of the individuals in accepting or rejecting technology. Innovative characteristics encompass; image, results demonstrability, and visibility, providing evidence that results demonstrability and visibility are components of observability, which positively corelate with the use and acceptance of the technology. Scanty of literature was found to validate the appropriateness of PCIT in using for academic acceptance online learning environments.

#### j) *The Motivation Model (MM)*

In this model (MM) technology acceptance is predicted using two factors(Davis et al., 1992). They are intrinsic motivation and extrinsic motivation. Extrinsic motivation is defined as the perceived valued outcome derived by performing an activity through the system. Improved job performance or time-saving, rewards and

recognition are typical extrinsic motivators for system users. Intrinsic motivators are defined as psychological reasons other than apparent benefits obtainable from the system use. Typically, fun, enjoyment are internal motives of system use. The MM hypothesis that output quality and "perceived ease of use" influence "perceived usefulness" and "perceived enjoyment". MM authors postulate that, due to the mediated relationship between ease of use, output quality, and perceived usefulness, the former two variables have indirect relationships with behavioral intention to use technology. Scanty of literature was found to validate the appropriateness of MM in using for academic acceptance of online learning environments.

k) *The model of PC Utilization (MPCU)*

This model fits to test technology acceptance from the perspective of personal computer utilization. MPCU assess actual behavior of humans in computer usage. Therefore, the component "behavioral intention to use" is excluded in this model. Additionally, this model does not consider the effect of habit in PC utilization since it supposedly has a tautological relationship with an individual's current use of computers. MPCU assess the influences of factors such as "facilitating conditions", "social influence", "complexity", "affect", "long term value of use", "perceived consequences" and, "job fit" on the computer use behavior of individuals. The use of MPCU in predicting academicians use of computers was confirmed by Ifenthaler and Schweinbenz (2013).

l) *Unified Theory of Acceptance and Use of Technology (UTAUT)*

Venkatesh et al. (2003) compared eight IS acceptance models and synthesizes UTAUT framework to assess an individual's acceptance or rejection of technology. The base models of UTAUT are Theory of Reasoned Action (Fishbein & Ajzen, 1975), the Motivational Model (Davis et al., 1992), the Model of PC utilization (Thompson et al., 1991), the Theory of Planned Behavior (Ajzen, 1991), the Combined TAM and TPB (Taylor & Todd, 1995), the Technology Acceptance Model (Taylor & Todd, 1995), the Innovation Diffusion Theory (Moore & Benbasat, 1991) and the Social Cognitive Theory (Bandura, 1986). Based on the predictive variables of these models, four factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions were identified in the UTAUT to explain behavioral intention to use technology. Further, UTAUT hypothesis moderating effects of individuals' age, gender, experience, and voluntariness on the UTAUT relationships. Many empirical studies validated the appropriateness in UTAUT in predicting academicians' acceptance of technology (Gunasinghe, Hamid, Khatibi, & Azam, 2018; Gunasinghe, Hamid, Khatibi, & Azam, 2019; Pardamean & Susanto, 2012; Radovan & Kristl, 2017; Raman et al.,

2014; Shen & Shariff, 2016; Sumak, Polancic, & Hericko, 2010; Sumak & Šorgo, 2016; K.-T. Wong, Teo, & Russo, 2013).

m) *Unified Theory of Acceptance and Use of Technology 2 (UTAUT2)*

The UTAUT model was extended by Venkatesh et al. (2012) and named it UTAUT2. The UTAUT2 consist of seven significant factors, of which three are new. The existing constructs (performance expectancy, effort expectancy, social influence and facilitating conditions) and the novel constructs (hedonic motivation, habit and price value) collectively predict an individual's intention to use technology. Its authors suggest that this model is more suitable to test the IS acceptance in the consumer setting. However, UTAUT 2 have been empirically validated in studies of (Admiraal et al., 2017; El-Masri & Tarhini, 2017; Raman & Don, 2013) explaining academic's acceptance of online learning technology.

n) *The Unified Theory of Acceptance and Use of Technology 3 (UTAUT3)*

The UTAUT3 framework Farooq et al. (2017) was introduced by extending the UTAUT2 framework. The UTAUT3 encompasses eight (8) drivers of technology acceptance, namely, performance expectancy, effort expectancy, social influence, facilitating conditions, habit, hedonic motivation, prize value with an additional independent variable namely personal innovativeness in IT. The UTAUT 3 was initially tested in an educational setting in testing the acceptance of lecture capture system of executive business studies in Malaysia.

### III. DISCUSSION

Scholars have developed multiple theories and models to understand human behavior in different contexts. Studies of technology acceptance have gained popularity over the last few decades, and this resulted emergence of various adoption models rooted through numerous disciplines. For instance, innovation diffusion theory (IDT) arose from sociology, whereas the "theory of resend action" (TRA) emerged from social-psychology and social cognitive theory (SCT) aroused in psychology. However, all these theories have proved their significance in predicting human behavior related to technology adoption. Same time, these theories focus on different aspects of human behavior applicable indiverse settings. For instance, IDT explains the behaviors of humans. However, models like TRA or TPB is focused on adoption decisions where organizational characteristics play a crucial role.

When theories like SCT assimilate the effect of the perceived outcome on when predicting human behavior; other frameworks such as TAM solely rely on individual's perceptions (believes) that determine technology adoption. Some models like IDT, TPB, and TAM, have unidirectional causal relationships lined up from external factors to cognitive beliefs that affect

attitudes and behavior. In contrast, theoretical models such as SCT has bidirectional causal paths, indicating that external factors, cognitive factors, emotions, and behavior affect each other, continuously.

TIB includes all constructs of TPB and more (i.e., habit and facilitating conditions) adding to its explanatory power. Therefore TPB, TIB frameworks are conceptually similar. But TPB is commonly seen in acceptance studies in predicting individuals' technology acceptance behavior than TIB. Similarly, some others theories like TAM and IDT have overlapping factors such as perceived ease of use (TAM) vs. complexity (IDT); perceived usefulness (TAM) vs. relative advantage (IDT). Further, the notion of facilitating conditions (UTAUT) is captured as perceived behavioral control in TPB, compatibility in IDT, or facilitating conditions (MPCU).

In most IS acceptance studies, a distinction between affection and cognition is not recognized. Therefore, Taherdoost (2018) stated that most technology acceptance theories and models are agnostic about any distinction in the effects of cognitive/affective factors. Affection is an attitude which typically has the connotations of like/dislike. Cognitive components include beliefs or perceptions an individual hold about a person, issue, or an object.

Perlusz (2004) argue that both beliefs and emotions (feelings/affect) influence technology acceptance behavior with few exceptions from theories such as UTAUT in which all the predictors of technology acceptance are cognitive (beliefs and perceptions).

In technology acceptance theories, emotions are mostly conceptualized as negative effects. For instance, computer anxiety (Chiu & Churchill, 2016; Russell & Bradley, 1997; Saadé & Kira, 2009), fear (Balanskat, Blamire, & Kefala, 2006) worry (MacGregor, 1991) In contrast, positive emotions such as joy, liking, happiness, enthusiasm, contentment were largely ignored in these theories (Taherdoost, 2018).

In terms of behavioral antecedents, some theories have emphasized on internal factors (antecedents) such as perceptions, values, feelings, attitudes, and intentions; while other theories focus on external factors such as social norms/social influence, rewards and incentives, organizational level constrains. Also, certain models have overlooked the operational definitions of the variables included in the model. (i.e., TIB) which make them difficult to measure.

#### IV. CONCLUSION

In this analysis, most prominent technology acceptance theories and their application in testing academic acceptance of technology were reviewed. It appears that IDT, TAM, and UTAUT are the mostly employed theories of academic's technology acceptance. Strong evidence was found confirming the correlations between key constructs of these models.

However, most empirical studies either modified or extended the original framework to explain the notion of academic technology acceptance. These studies signify several factors as determinants of academic's acceptance of online learning technology. Intention and attitude are the two main significant factors determining technology adoption behavior, influenced by several other independent antecedent variables such as perceived usefulness (performance expectancy), ease of use (effort expectancy), perceived risk (anxiety), perceived behavioral control (self-efficacy), social influence and facilitating conditions.

The scope of this study is limited to identifying the evidence to support the suitability of IS theories in explaining academicians' acceptance of online learning technology. Thus, this study does not focus on the oretical concepts that explain user behavior beyond "acceptance". (i.e. post adoption behavior or continuous usage behavior). Further, this study does not provide an empirical analysis or a statistical evaluation to judge the suitability of each theory in understanding academics' technology acceptance. Future studies should focus on assessing other aspects of technology-based learning that is essential for successful proliferation of such systems; beyond typical use and acceptance. Finally, to prevent from any emerging gap between concepts (theory) and practice, both researchers and practitioners should make use of existing theoretical bases to develop measures and process models to influence potential users to accept technologies such as online learning environments.

#### REFERENCES RÉFÉRENCES REFERENCIAS

1. Admiraal, W., Louws, M., Lockhorst, D., Paas, T., Buynsters, M., Cviko, A., . . . Post, L. (2017). Teachers in school-based technology innovations: A typology of their beliefs on teaching and technology. *Computers & Education, 114*, 57-68.
2. Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In *Action control* (pp. 11-39): Springer.
3. Ajzen, I. (1991). The theory of planned behaviour. *Organizational Behaviour and Human Decision Processes, 50*, 179-211. *De Young, 509-526*.
4. Al-Emran, M., Mezhuayev, V., & Kamaludin, A. (2018). Technology Acceptance Model in M-learning context: A systematic review. *Computers & Education, 125*, 389-412.
5. Alias, N. A., & Zainuddin, A. M. (2005). Innovation for better teaching and learning: Adopting the learning management system. *Malaysian online journal of instructional technology, 2(2)*, 27-40.
6. Anderson, S. E., Groulx, J. G., & Maninger, R. M. (2011). Relationships among preservice teachers' technology-related abilities, beliefs, and intentions

- to use technology in their future classrooms. *Journal of Educational Computing Research*, 45(3), 321-338.
7. Annetta, L. A., Folta, E., & Klesath, M. (2010). *V-Learning: Distance education in the 21st century through 3D virtual learning environments*: Springer Science & Business Media.
  8. Balanskat, A., Blamire, R., & Kefala, S. (2006). *The ICT impact report: A review of studies of ICT impact on schools in Europe*: European Communities.
  9. Bandura, A. (1986). The explanatory and predictive scope of self-efficacy theory. *Journal of social and clinical psychology*, 4(3), 359-373.
  10. Bano, M., & Zowghi, D. (2015). A systematic review on the relationship between user involvement and system success. *Information and Software Technology*, 58, 148-169.
  11. Brahier, B. R. (2006). *Examining a model of teachers' technology adoption decision making: An application of diffusion of innovations theory*: University of Minnesota.
  12. Carter, L., & Belanger, F. (2004). The influence of perceived characteristics of innovating on e-government adoption. *Electronic Journal of E-government*, 2(1), 11-20.
  13. Chiu, T. K., & Churchill, D. (2016). Adoption of mobile devices in teaching: Changes in teacher beliefs, attitudes and anxiety. *Interactive Learning Environments*, 24(2), 317-327.
  14. Davis, F. (1986). *A technology acceptance model for empirically testing new end-user information systems: theory and results*. Doctoral dissertation, Sloan School of Management, Massachusetts Institute ...
  15. Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS quarterly*, 319-340.
  16. Davis, F., Bagozzi, R., & Warshaw, P. (1989). User Acceptance of Computer Technology: A Comparison of Two Theoretical Models. *Management Science*, 35(8), 982-1003. doi:10.1287/mnsc.35.8.982
  17. Davis, F., Bagozzi, R., & Warshaw, P. (1992). Extrinsic and Intrinsic Motivation to Use Computers in the Workplace. *Journal of Applied Social Psychology*, 22(14), 1111-1132. doi:10.1111/j.1559-1816.1992.tb00945.x
  18. Dillon, A. (2001). User acceptance of information technology. In: London: Taylor and Francis.
  19. El-Masri, M., & Tarhini, A. (2017). Factors affecting the adoption of e-learning systems in Qatar and USA: Extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2). *Educational Technology Research and Development*, 65(3), 743-763.
  20. Farooq, M. S., Salam, M., Jaafar, N., Fayolle, A., Ayupp, K., Radovic-Markovic, M., & Sajid, A. (2017). Acceptance and use of lecture capture system (LCS) in executive business studies: Extending UTAUT2. *Interactive Technology and Smart Education*, 14(4), 329-348.
  21. Fathema, N., Shannon, D., & Ross, M. (2015). Expanding the Technology Acceptance Model (TAM) to examine faculty use of Learning Management Systems (LMSs) in higher education institutions. *Journal of Online Learning & Teaching*, 11(2).
  22. Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: an introduction to theory and research*.
  23. Frank, K. A., Zhao, Y., & Borman, K. (2004). Social capital and the diffusion of innovations within organizations: The case of computer technology in schools. *Sociology of education*, 77(2), 148-171.
  24. Gibson, S. G., Harris, M. L., & Colaric, S. M. (2008). Technology acceptance in an academic context: Faculty acceptance of online education. *Journal of Education for Business*, 83(6), 355-359.
  25. Gunasinghe, A., Hamid, J. A., Khatibi, A., & Azam, S. (2018). Does the Lecturer's Innovativeness Drive VLE Adoption in Higher Education Institutes?(A Study Based on Extended UTAUT). *Journal of Information Technology Management*, 10(3), 20-42.
  26. Gunasinghe, A., Hamid, J. A., Khatibi, A., & Azam, S. F. (2019). DOES ANXIETY IMPEDE VLE ADOPTION INTENTIONS OF STATE UNIVERSITY LECTURERS?-A STUDY BASED ON MODIFIED UTAUT FRAMEWORK. *European Journal of Social Sciences Studies*.
  27. Holsapple, C. W., & Lee-Post, A. (2006). Defining, assessing, and promoting e-learning success: An information systems perspective. *Decision sciences journal of innovative education*, 4(1), 67-85.
  28. Ifenthaler, D., & Schweinbenz, V. (2013). The acceptance of Tablet-PCs in classroom instruction: The teachers' perspectives. *Computers in human behavior*, 29(3), 525-534.
  29. Igbaria, M., Parasuraman, S., & Baroudi, J. J. (1996). A motivational model of microcomputer usage. *Journal of management information systems*, 13(1), 127-143.
  30. Igbaria, M., Schiffman, S. J., & Wieckowski, T. J. (1994). The respective roles of perceived usefulness and perceived fun in the acceptance of microcomputer technology. *Behaviour & Information Technology*, 13(6), 349-361.
  31. Johnson, K. E., & Ma, P. (1999). *Understanding language teaching: Reasoning in action*: Heinle & Heinle Boston, MA.
  32. Kim, Y. G., & Woo, E. (2016). Consumer acceptance of a quick response (QR) code for the food traceability system: Application of an extended technology acceptance model (TAM). *Food Research International*, 85, 266-272.

33. Lai, P. (2017). The literature review of technology adoption models and theories for the novelty technology. *JISTEM-Journal of Information Systems and Technology Management*, 14(1), 21-38.
34. Lee, J., Cerreto, F. A., & Lee, J. (2010). Theory of planned behavior and teachers' decisions regarding use of educational technology. *Journal of Educational Technology & Society*, 13(1), 152-164.
35. Lee, Y.-H., Hsieh, Y.-C., & Hsu, C.-N. (2011). Adding innovation diffusion theory to the technology acceptance model: Supporting employees' intentions to use e-learning systems. *Journal of Educational Technology & Society*, 14(4), 124-137.
36. Li, C.-G., Huang, X.-E., Xu, L., Li, Y., & Lu, Y.-Y. (2012). Clinical application of serum tumor associated material (TAM) from non-small cell lung cancer patients. *Asian Pacific Journal of Cancer Prevention*, 13(1), 301-304.
37. Lule, I., Omwansa, T. K., & Waema, T. M. (2012). Application of technology acceptance model (TAM) in m-banking adoption in Kenya. *International Journal of Computing & ICT Research*, 6(1).
38. Ma, J., Han, X., Yang, J., & Cheng, J. (2015). Examining the necessary condition for engagement in an online learning environment based on learning analytics approach: The role of the instructor. *The Internet and Higher Education*, 24, 26-34.
39. MacGregor, D. (1991). Worry over technological activities and life concerns. *Risk analysis*, 11(2), 315-324.
40. Mirzajani, H., Mahmud, R., Fauzi Mohd Ayub, A., & Wong, S. L. (2016). Teachers' acceptance of ICT and its integration in the classroom. *Quality Assurance in Education*, 24(1), 26-40.
41. Misbah, Z., Gulikers, J., Maulana, R., & Mulder, M. (2015). Teacher interpersonal behaviour and student motivation in competence-based vocational education: Evidence from Indonesia. *Teaching and Teacher Education*, 50, 79-89.
42. Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information systems research*, 2(3), 192-222.
43. Nahar, N., Kakola, T., & Huda, N. (2002). *Diffusion of software technology innovations in the global context*. Paper presented at the Proceedings of the 35th Annual Hawaii International Conference on System Sciences.
44. Nanayakkara, S., & Kusumsiri, N. (2013). Barriers to Successful Implementation of E-Learning in Design Education. *International Journal of Computer Science and Technology*, 7(1), 25-30.
45. Nanayakkara, S., Kusumsiri, N., & Perera, P. (2016). Adaptation of Diffusion of Innovations Theory for Successful ERP Implementation. *International Journal of Computer Science and Technology*, 7(1).
46. Pardamean, B., & Susanto, M. (2012). Assessing User Acceptance toward Blog Technology Using the UTAUT Model. *International Journal of Mathematics and Computers in Simulation*, 6.
47. Perlusz, S. (2004). *Emotions and technology acceptance: development and validation of a technology affect scale*. Paper presented at the 2004 IEEE International Engineering Management Conference (IEEE Cat. No. 04CH37574).
48. Phungsuk, R., Viriyavejakul, C., & Ratanaolarn, T. (2017). Development of a problem-based learning model via a virtual learning environment. *Kasetsart Journal of Social Sciences*, 38(3), 297-306.
49. Poon, J. (2013). Blended learning: An institutional approach for enhancing students' learning experiences. *Journal of online learning and teaching*, 9(2), 271-288.
50. Radovan, M., & Kristl, N. (2017). Acceptance of Technology and Its Impact on Teachers' Activities in Virtual Classroom: Integrating UTAUT and Col into a Combined Model. *Turkish Online Journal of Educational Technology-TOJET*, 16(3), 11-22.
51. Raman, A., & Don, Y. (2013). Preservice teachers' acceptance of learning management software: An application of the UTAUT2 model. *International Education Studies*, 6(7), 157-164.
52. Raman, A., Don, Y., Khalid, R., Hussin, F., Omar, M. S., & Ghani, M. (2014). Technology acceptance on smart board among teachers in Terengganu using UTAUT model. *Asian Social Science*, 10(11), 84.
53. Rizzo, T. L., & Kirkendall, D. R. (1995). Teaching students with mild disabilities: What affects attitudes of future physical educators? *Adapted Physical Activity Quarterly*, 12(3), 205-216.
54. Rogers, E. (1983). *Diffusion of innovations*: The Free Press.
55. Russell, G., & Bradley, G. (1997). Teachers' computer anxiety: implications for professional development. *Education and Information Technologies*, 2(1), 17-30. doi:10.1023/A:1018680322904
56. Saadé, R. G., & Kira, D. (2009). Computer anxiety in e-learning: The effect of computer self-efficacy. *Journal of Information Technology Education: Research*, 8, 177-191.
57. Shen, C. M., & Shariff, S. A. (2016, 2016). *Apply UTAUT Model for Understanding the Teacher Perceptions Using Frog VLE*. Paper presented at the Postgraduate Annual Research On Informatics Seminar (Paris 2016).
58. Sumak, B., Polancic, G., & Hericko, M. (2010, 2010/02/). *An Empirical Study of Virtual Learning Environment Adoption Using UTAUT*. Paper presented at the Second International Conference on Mobile, Hybrid, and On-Line Learning.
59. Šumak, B., & Šorgo, A. (2016). The acceptance and use of interactive whiteboards among teachers:

- Differences in UTAUT determinants between pre- and post-adopters. *Computers in human behavior*, 64, 602-620.
60. Taherdoost, H. (2018). A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*, 22, 960-967.
  61. Taylor, S., & Todd, P. (1995). Assessing IT usage: The role of prior experience. *MIS quarterly*, 561-570.
  62. Teo, T. (2009). The impact of subjective norm and facilitating conditions on pre-service teachers' attitude toward computer use: A structural equation modeling of an extended technology acceptance model. *Journal of Educational Computing Research*, 40(1), 89-109.
  63. Teo, T. (2013). A Comparison of Non-Nested Models in Explaining Teachers' Intention to Use Technology. *British Journal of Educational Technology*, 44(3).
  64. Teo, T., & Beng Lee, C. (2010). Explaining the intention to use technology among student teachers: An application of the Theory of Planned Behavior (TPB). *Campus-Wide Information Systems*, 27(2), 60-67.
  65. Teo, T., Lee, C. B., Chai, C. S., & Wong, S. L. (2009). Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multigroup invariance analysis of the Technology Acceptance Model (TAM). *Computers & Education*, 53(3), 1000-1009.
  66. Teo, T., & Noyes, J. (2011). An assessment of the influence of perceived enjoyment and attitude on the intention to use technology among pre-service teachers: A structural equation modeling approach. *Computers & Education*, 57(2), 1645-1653.
  67. Thompson, R. L., Higgins, C. A., & Howell, J. M. (1991). Personal computing: toward a conceptual model of utilization. *MIS quarterly*, 125-143.
  68. Triandis, H. C. (1977). *Interpersonal behavior*: Brooks/Cole Publishing Company Monterey, CA.
  69. Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the technology acceptance model: Four longitudinal field studies. *Management Science*, 46(2), 186-204.
  70. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
  71. Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology. *MIS quarterly*, 12(1), 157-178.
  72. Waheed, M., & Jam, F. A. (2010). Teacher's intention to accept online education: Extended TAM model. *Interdisciplinary Journal of Contemporary Research in Business*, 2(5), 330-344.
  73. Wong, K.-T. (2013). Understanding Student Teachers' Behavioural Intention to Use Technology: Technology Acceptance Model (TAM) Validation and Testing. *Online Submission*, 6(1), 89-104.
  74. Wong, K.-T., Teo, T., & Russo, S. (2013). Interactive whiteboard acceptance: Applicability of the UTAUT model to student teachers. *The Asia-Pacific Education Researcher*, 22(1), 1-10.
  75. Wong, K. T., Russo, S., & McDowall, J. (2013). Understanding early childhood student teachers' acceptance and use of interactive whiteboard. *Campus-Wide Information Systems*.
  76. Yuen, A. H., & Ma, W. W. (2008). Exploring teacher acceptance of e-learning technology. *Asia-Pacific Journal of Teacher Education*, 36(3), 229-243.
  77. Zhu, K., Dong, S., Xu, S. X., & Kraemer, K. L. (2006). Innovation diffusion in global contexts: determinants of post-adoption digital transformation of European companies. *European journal of information systems*, 15(6), 601-616.

