Revisiting the Unified Theory of Acceptance and the Use of Technology (UTAUT) Model and Scale: An Empirical Evolution of Educational Technology

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Abstract

Over the years, the Unified Theory of Acceptance and Use of Technology (UTAUT) model has been widely adopted for technology research dealing with intention and behavior. More currently, with the advancement of educational technology, the constructs embedded in this model and survey instrument can be easily applied to this setting. The UTAUT draws upon eight previously validated models: the theory of reasoned action; the technology acceptance model; the motivational model; the theory of planned behavior; the theory of planned behavior; the model of PC utilization; innovation diffusion theory; and social cognitive theory. This paper revisits the constructs of the UTAUT model and scale examining its conceptualization and validation. While doing so, users are presented with a historical evolution of technology research that can be used to further examine educational technology.

Introduction

Since its introduction, the Unified Theory of Acceptance and Use of Technology (UTAUT) model has been widely validated and used as a theoretical lens for adoption and diffusion research, looking at user intention and behavior within multiple contexts. Currently, the induction of technological innovations has prompted researchers to concentrate on examining adoption and diffusion factors and rates bringing this area of academia to fruition (Venkatesh, Morris, Davis & Davis, 2003; Williams, Rana & Dwivedi, 2015). Subsequently, the existence of several technology models prompted Venkatesh et al. (2003) to unite multiple theories into one overarching model to explain technology adoption and usage. In the educational arena, these theories and models have been applied to traditional online and distance learning formats. More currently, blended or hybrid learning, along with MOOCs or Massive Open Online Courses delivery systems, have brought new opportunities to empirically examine the effectiveness of technology assisted learning modalities.

The UTAUT model was originally developed through the combination of eight dominant technology theories to form one universally accepted model for the use of technology: the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM), the Motivational Model, the Theory of Planned Behavior (TPB), a combination of the TBP/TAM, the Model of PC Utilization, Innovation of Diffusion Theory (IDT), and Social Cognitive Theory (SCT) (Williams et al., 2015). To develop and test the UTAUT model, Venkatesh, et al. (2003) conducted validation procedures for the combined scale, which resulted in an overall adjusted R^2 of 69%. This validation study not only established the relevance of the UTAUT model but its dominance in regard to previous theories. Fast-forward 12 years later, Williams et al. (2015) study found that the UTAUT model is still widely used today especially in the areas of e-government, e-banking, e-learning, and e-commerce. In this paper, e-learning is used broadly as an encompassing term for the use of technology via the internet, computer based learning, on-line learning, or web-based teaching, learning, and training modalities. Practitioners and researchers generally agree that technological advances have been dramatically altering the global landscape of teaching, business, and everyday lives; this paper reviews the historical literature on e-learning which can be used by both practitioner and researchers alike.

Review of the Literature

By combining the previously stated theories, Venkatesh et al. (2003) ultimately identified four direct determinants of acceptance and usage behavior: performance expectancy, effort expectancy, social influence, and facilitating conditions. Used in real world situations, researchers are able to determine an individual's intent to use a specific system, thus identifying the key influences of acceptance (Williams et al., 2015). Each of the eight underlying social and psychological theories that comprise the UTAUT model are examined and discussed in the following literature.

Model of PC Utilization (MPCU)

The dawn of research on information systems (IS) began approximately thirty years ago with Thompson, Higgins, and Howell (1991) proposing one of the first models of computer use. Previously, Davis, Bagozzi, and Warsaw (1989) conceptualized two theories on user acceptance of computer technology and Cooper and Zmud (1990) published research on technology innovation and diffusion. The early beginnings of technology research drew from social psychology theories such as Fishbein and Azjen's (1975) theory of reasoned action. Additionally, Thompson et al. (1991) based their technology research on PC utilization primarily on Triandis' (1971) theory of behavioral intention. While Thompson et al. (1991) modified and refined Triandis' original constructs to fit the context of technology, the foundation of their Model of PC Utilization (MPCU) was grounded on the idea that immediate emotions drive future actions. The final MPCU included social factors, affect, and perceived consequences as predictors of intentions resulting in final behaviors. One final factor, facilitating conditions, was hypothesized to directly influence behavior rather than being mediated by intentions.

In 1991, Thompson et al. further redefined Triandis' (1971) social norms construct into a broader social factor category whereby an individual's prior experiences in social situations determine ultimate behaviors. Four aspects of culture include societal norms, group and systems roles, and internalized values, which strongly influence an individual's decision to behave in a particular way. Thompson et al. (1991) arguably had strong justification for incorporating social factors within the context of technology as prior research regarding the relationship between innovation and adoption had already been tested and established (Davis et al., 1989; Fishbein & Ajzen, 1975).

As conceptualized by Triandis (1971), affect was defined as, "an idea charged with affect, that predisposes class actions to a particular class of social situations" (pg. 2). Perceived consequences influencing behavior mirrors Vroom's (1964) motivational expectations theory; Thompson et al. (1991) extended these ideas and hypothesized that perceived PC complexity, consequences, and job-fit would all impact PC utilization. Finally, Thompson, et al. (1991) included facilitating conditions as another important criterion for PC use. This construct also originates from Triandis (1971) theory that objective environmental factors influence behaviors. The environment surrounding technology behaviors can be seen through training, assistance, and other supportive conditions allowing someone to more easily do their job or overcome difficulties and barriers.

Motivational Model (MM)

A number of studies in psychology support the theory of motivation as an explanation for behavior (Venkatesh et al., 2003). Most motivational models include three constructs: extrinsic and intrinsic motivation and amotivation. Preliminary research found that extrinsic motivation involves behaviors used to achieve goals, avoid consequences, or obtain rewards. In contrast, intrinsic motivation involves self-performed behaviors to experience pleasure and satisfaction from an activity (Deci & Ryan, 1980, 1985). Most technology users that engage in activities that benefit themselves are using extrinsic motivation (Davis, Bagozzi & Warshaw, 1992). The authors continue that individuals who are intrinsically motivated take part in activities that have no apparent reinforcement other than performing the process itself (Davis, Bagozzi & Warshaw, 1992). Individuals who experience amotivation tend to lack purpose in respect to the current activity (Vallerand, 1997). Amotivation further refers to individuals' absence of motivation and lack of intentionality (Deci & Ryan, 1985; Koestner,

Losier, Vallerand & Carducci, 1996). For these reasons we refer to the hierarchical model of intrinsic and extrinsic motivation developed by Vallerand (1997) as it provides a fundamental review of these constructs as they differ in nature.

Vallerand's (1997) hierarchical model of intrinsic and extrinsic motivation provides a fundamental review of these constructs as they differ in nature. From a theoretical perspective, intrinsic and extrinsic motivation are vastly different. Intrinsic motivation rests in the process itself, whereas extrinsic motivation lies within the benefits an individual may obtain through participation (Vallerand, 1997). For example, if we were to ask an intrinsically motivated person to continue working if they won the lottery, more than likely they would continue with their career. From a phenomenological perspective, Vallerand (1997) asserts that intrinsically motivated individuals tend to experience pleasant emotions contrary to the emotions of tenseness and pressure from extrinsic motivation. On the other hand, amotivation, is the lack of intention to engage in a behavior or simply the absence of motivation. Deci and Ryan (1985; 2002) furthered the definition of amotivation to stress that individuals who are amotivated are not able to perceive the relationship between their behavior and that particular behavior outcome. Amotivated behaviors tend to be executed for unknown reasons or not executed at all (Legault, Green-Demers & Pelletier, 2006).

While motivation and amotivation are segmented by their differences, each is also multi-dimensional. Previous social psychologist researchers postulate that there are three types of intrinsic motivation as well as four types of extrinsic motivation. Intrinsic motivation includes: (1) intrinsic motivation to know, (2) intrinsic motivation toward accomplishments and (3) intrinsic motivation to experience stimulation (Vallerand et al., 1989, 1992, 1993). The distinction is useful as it may take the lead in predicting specific activity engagement (Vallerand & Briére, 1990). The four distinct extrinsic motivation categories include: (1) external regulation, (2) introjected regulation, (3) identified regulation and (4) integrated regulation (Vallerand, 1997). Further, Deci and Ryan (1985) suggest that extrinsic motivation varies in terms of self-determination. Finally, drawing upon the work of Deci and Ryan (1985), Skinner (1995), Seligman (1975) and Pelletier and his colleagues (Pelletier, Dion, Trison & Green-Demers, 1997; Stewart, Green-Demers, Pelletier & Tuson, 1995; Tuson & Pelletier, 1992) all suggest there are four types of amotivation: (1) amotivation due to capacity-ability beliefs, (2) amotivation that results from the individual's conviction that the strategy will not bring the desired outcome, (3) amotivation resulting from the belief that the behavior is too demanding and the individual does not want to put forth the necessary effort and (4) helplessness beliefs.

Motivation has long been a major concern of educators and its role in teaching and learning has been widely examined. Motivation, within the context of education, is directly applicable to technology acceptance. As we shift more and more to learning with technology, educators are challenged to find ways to keep students motivated with digital tools. As early as 2000, research is indicating that digital natives, who are already familiar with technology, are responding well to technology-infused activities and tools such as videos, podcasts, and web pages; in the classrooms some have found these strategies are more effective than traditional methods (Granito & Chernobilsky, 2012; Miller, 2009; Prensky, 2001).

Diffusion of Innovations Theory (IDT)

Diffusion of Innovations Theory (DOI) offers the foundational framework for studying the processes of adoption of innovations from agriculture to organizations in a variety of technology applications (Rogers, 1962). Rogers defined *innovations* as ideas, practices, or objects perceived as new by an individual or culture. *Diffusion* is a communication process over time among members of a social system resulting in individual or social change. Specialized interpersonal communication channels are also necessary for diffusion as social systems ultimately decide to modify an innovation to fit their culture. *Adoption* is predicated on the decision of, "full use of an

innovation as the best course of action available" and rejection is the decision "not to adopt an innovation" (Rogers, 1962, p. 177).

Conceptions of diffusion, innovations, and subsequently, adoption were originally grounded in economics, sociology, and communication theories (Yousafazai, 2012). Rogers adapted these theories and proposed a new DOI theory which includes five innovation characteristics: relative advantage (RA), compatibility (CO), complexity (CP), trialability (TR) and observability (OB). RA relates to the belief that an innovation is better than the existing structure and a significant predictor of behavioral intention to use an innovation (Tan & Teo, 2010). Yousafazai (2012) proposes that CO is "consistent and congruent" with one's current social and individual technology understanding, based on experience. As such, the complexity of a new innovation is somewhat mediated leading to increased compatibility. Rogers further proposes that the rate of adoption is influenced by multiple perceptions of relative advantage over a previous technology, compatibility with existing needs, complexity and perceived difficulty of use, and available triability and observability to experiment and see the results of the innovation. A final component offered by the DOI theory is a classification structure of adopters. Innovators tend to rapidly embrace a technology followed closely by early adopters who readily accept change. Alternately, early majority adopters typically need more time, whereas, late majority adopters openly express skepticism but will eventually buy-in to the innovation once the majority has accepted the change. Lastly, individuals more comfortable with the status quo are termed laggards (Rogers, 1962, 2003).

In 1991, Moore and Benbasat adapted and renamed Roger's DOI model to Innovation Diffusion Theory (IDT) to more closely connect to the adoption of information systems and technology. The final constructs of IDT included relative advantage, ease of use, image, visibility, compatibility, visibility, results demonstrability, and voluntariness of use.

Technology Acceptance Model (TAM; TAM2; C-TAM-TPB)

In response widespread growth in technology use by organizations, Davis, Bagozzi, and Warshaw (1989) began questioning why people use or reject technology. Their research goal was to develop a measure of user acceptance to explain, identify, and predict the underlying psychological and social drivers of behavioral intention. The result of their research was a conceptual model grounded in previously established measures of attitudes and subjective norms, and perceived usefulness and ease of use related to technology, the Technology Acceptance Model (TAM). Over subsequent years, Davis, et al. extended their research and proposed the TAM2 and another model combining the original TAM with the theory of Planned Behavior (C-TAM/TPB).

As organizations introduced new end-user computing tools into the work environment, they naturally saw an unwillingness of their employees to immediately embrace these innovations. Even with the hope of improved productivity and capacity to make informed business decisions with potentially powerful information systems (IS), the success of technology could not come to fruition if designers did not overcome the associated technical barriers (Alavie, 1984; Gould & Lewis, 1985).

Simultaneous to the growth of technology hardware and software, several researchers began studying the influence of personal attitudes and internalized social beliefs influencing on behavioral intentions, acceptance, and use of IS (Alavi, 1984; Benbasat, Dexter, & Todd, 1986). However, some researchers felt that original measures were not always grounded in sound theoretical underpinnings which generally resulted in mixed findings. Davis, et al. (1989) started their research by looking into various behavioral theories such as Fishbein and Ajzen's (1975) theory of reasoned action (TRA) and later, the theory of planned behavior (TPB) by Ajzen (1985) to support their technology acceptance model. The TRA constructs were already widely accepted as an evidence-based model for understanding human behavior; that is, individual behavioral intention (BI) is determined by subjective norms (SN) attitude (A). Davis, et al. modified the TRA by adapting the constructs to

be computer specific and proposed that computer usage behavior is predicated on perceived usefulness and ease of use, user attitudes toward technology, intentions, and eventual adoption behavior.

In 2000, Venkatesh and Davis extended the original TAM instrument and model by including multiple sub-constructs of Perceived Usefulness (PU). In addition, these authors hypothesized that experience and voluntariness would also impact the Intention to Use construct. Theoretically, the TAM continued to measure both cognitive processes and social influences of usefulness and usage intentions (UI). Social influences such as norms, image, and voluntariness were now thought to directly correlate with PU; subjective norms also directly influenced Intention rather than only through PU. The underlying cognitive instrumental processes were extended to include job relevance, output quality, and result demonstrability. The final model constructs explained approximately 40%-60% of the variance in PU and 34%-52% of variance in UI (Venkatesh & Davis, 2000).

Another modification of the TAM occurred as Taylor and Todd (1995) posited that the expectancy-value approach and behavioral control constructs of the theory of planned behavior (TPB) should be combined with the TAM. The findings of this study resulted in the belief that the combined model, C-TAM-TPB, more fully explained behavioral intentions. Weighted average structural equation methods were conducted to test the hypothesized paths and model fit as well as R2 indices for explanatory significance between the scale items. Overall, Taylor and Todd (1995) believe that the benefit of incorporating TPB variables toward the understanding of behavioral intentions outweighs the negative complexity aspects of the combined model.

Theory of Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) has been one of the foundational theories used in predicting individual behavior and/or intentions (Madden, Ellen & Ajzen, 1992). As one of the most fundamental theories in social psychology, Madden, et al. postulate that behavioral intention is predicated on the probability that performing the behavior will lead to a precise outcome (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). Fishbein and Ajzen (1975) propose that behavior is divided further into two distinctive sets: behavioral and normative. Attitude toward behavior is defined as "an individual's positive or negative feelings (evaluative affect) about performing the target behavior" (Ajzen & Fishbein, 1975, p. 216). Subjective norm is defined as "the person's perception that most people who are important to him think he should or should not perform the behavior in question" (Ajzen & Fishbein, 1975, p. 302). Madden, et al. (1992) assert that the behavioral beliefs are the primary influence on the attitude towards executing the behavior, while normative beliefs guide an individual's subjective norm about executing the behavior. Consequently, information affects intentions while behavior is influenced by suggestive norms. In addition, Fishbein and Ajzen (1975) note there are three conditions that affect the relational magnitude between behavior and intentions: (1) the degree to which the measure of intention and behavior correspond with their levels of specificity, (2) stability of intentions between time measurement and behavior performance and (3) the individual's volitional control of carrying out the intention.

Years after the development of TRA, Sheppard, Hartwick and Warshaw (1988) conducted a meta-analysis and concluded that the TRA model could be used to accurately predict behavioral intentions as well as identifying behavior-changing strategies. TRA was originally founded on the assumption that behaviors were under full volitional control, however, after Sheppard's, et al. findings, Ajzen (1985) proposed an extension to TRA to include perceived behavioral control as a forerunner to behavioral intentions. With this extension, researchers could now account for individuals who lacked full volitional control over their behaviors.

Theory of Planned Behavior (TPB)

The theory of planned behavior (TPB) was developed in 1985 by Icek Ajzen as an extension of TRA by adding perceived behavioral control. In TPB, perceived behavioral control is theorized to be a determinant of behavior and intention (Venkatesh et al., 2003). To predict behavior performance TPB uses the factor of intention (I). Mathieson (1991) explained that intention is predicted by three factors: attitude toward the behavior (A),

subjective norms (SN) and perceived behavioral control (PBC). The conceptual definitions of attitude toward behavior and subjective norms for TPB were adopted from TRA, but with the addition of perceived behavioral control. Ajzen (1991) defines perceived behavioral control as "the perceived ease or difficulty of performing the behavior" (p. 188). The origin of TPB was developed as an extension of theory of reasoned action (TRA) (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) as the original TRA model did not account for behaviors for which individuals did not have complete control (Ajzen, 1991). To predict these nonvolitional behaviors, the TPB incorporated perceptions of control over behavior performance as an additional predictor (Ajzen, 1988, 1991). These perceptions of control considerations are important as they extend the theory's applicability from volitional behaviors to multifaceted goals and outcomes that are contingent upon other intricate behaviors (Conner & Armitage, 1998).

In the beginning of the TPB there were very few empirical tests of its effectiveness. To ensure the theory's applicability, Schifter and Ajzen (1985) successfully applied TPB to weight loss behavior. Later, the TPB was tested again to predict students' decisions on class attendance and earning good grades (Ajzen & Madden, 1986). There have been more empirical tests of the TRA model, being that the TPB model is based on it. The key difference between the models is that TRA does not consider perceived behavioral control (Mathieson, 1991). The TRA model predicts behavior strictly from attitudes and subjective norms and is predictive in situations where there are no barriers to behavioral performance (Fishbein & Ajzen, 1975). Sheppard, Hartwick and Warshaw (1988) conducted a meta-analysis of 87 studies and established that there was "strong support for the overall predictive utility of the Fishbein and Ajzen [TRA] model" (p. 336).

Social Cognitive Theory (SCT)

Social cognitive theory is based on a model of emergent interactive agency signifying that humans make their own contributions to their own behaviors and motivation through a system of triadic reciprocal causation (Bandura, 1989). Bandura continues in that the reciprocal causation system, both cognitive and affective factors, along with other personal factors and environmental events, operate as interacting elements. Therefore, any determinants of human action must include self-generated influences including beliefs of self-efficacy (Bandura, 1989). Self-efficacy beliefs normally contribute to cognitive functioning through the influence of motivation and information processing. In turn, Bandura (1989) asserts that people's belief in their own self-efficacy determines their level of motivation. The stronger a person believes in their own capacity will determine how persistent they are in their efforts (Bandura, 1988).

In social cognitive theory, human behavior is motivated and regulated by self-influence and other self-regulative factors (Bandura, 1991). These factors include self-monitoring of one's behavior, judgment of behavior and self-reaction. Together, these self-regulatory systems rest at the core of causal processes and thus provide the basis for purposeful action (Bandura, 1991). Individuals possess various capabilities, some of which are self-reflective and self-reactive, which in turn exercise control over thoughts, feelings, motivation and actions (Bandura, 1991). As individuals grow and observe other standards of behaviors, these actions are then regulated and modified through the self-reactive process. Bandura (1991) supports this assumption in that "human functioning is, therefore, regulated by an interplay of self-generated and external sources of influence" (p. 249). The structure of self-regulation is carried out through psychological sub functions that must be developed over a period of time. However, Bandura and Simon (1977) contested that intention and desire have little effect if people do not have the capability to influence their own behavior and motivation.

Social cognitive theory is composed of various constructs such as outcome expectations-performance, outcome expectations-personal, self-efficacy, affect and anxiety. Compeau and Huggins (1995) define outcome expectations-performance as the consequences of the behavior, specifically the expectations that deal with the outcomes related to jobs. The authors continue in that outcome expectations-personal are also consequences of

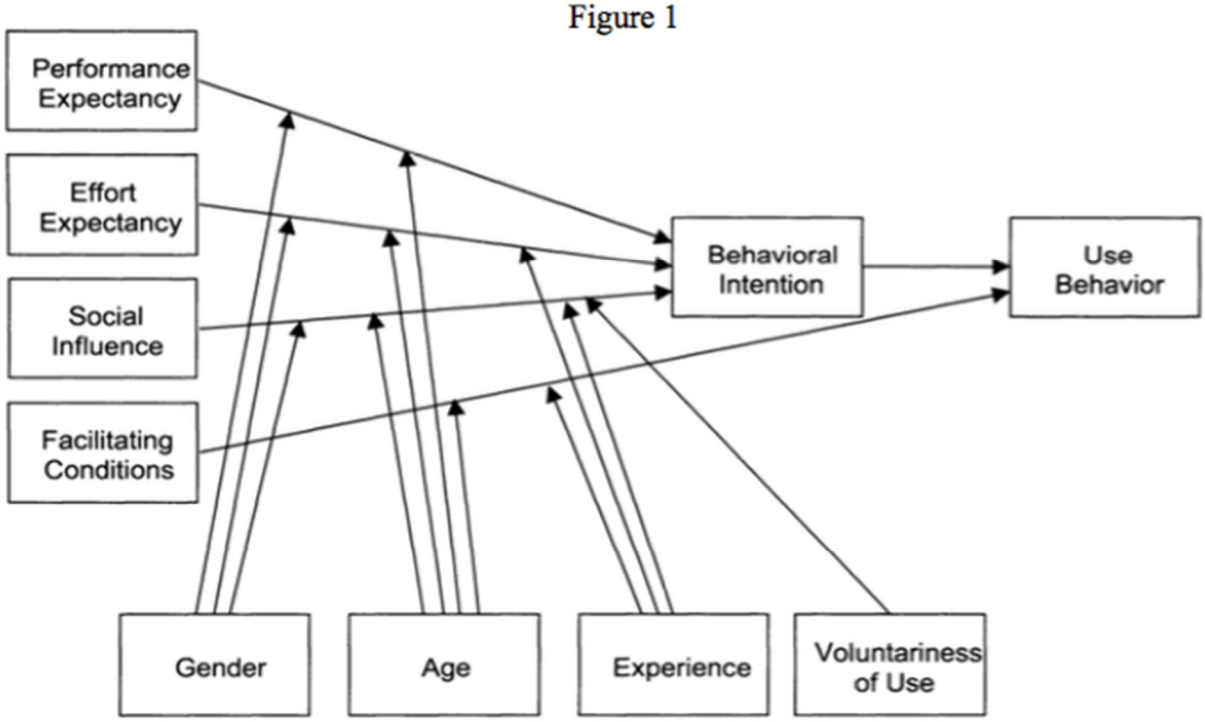
behaviors but relate to personal senses of accomplishment and self-esteem. For the construct of self-efficacy, Venkatesh et al. (2003) defined it as the "judgment of one's ability to use a technology (e.g. computer) to accomplish a particular job or task" (p. 432). The authors continue in defining the last two constructs; affect, "an individual's liking for a particular behavior" and anxiety as "evoking anxious or emotional reactions when it comes to performing a behavior (e.g., using a computer)" (p. 432).

Empirical Validation and Conceptualization of the UTAUT

The final UTAUT model (Figure 1) and measurement scale consists of four major predictor constructs of behavioral intention (BI) and, ultimately, use behavior (UB): (1) performance expectancy; (2) effort expectancy; (3) social influence; and (4) facilitating conditions. The construct, behavioral intention, has been used as both a dependent variable of the first three constructs and as an independent variable predicting use behavior. Use behavior, as conceptualized in the UTAUT model, is influenced by behavioral intention and only one of the four major constructs, facilitating conditions.

Methodology: Validation of the UTAUT. In order to validate the combined theoretical scales and create the final UTAUT scale, Venkatesh, et al. (2003) began by creating an instrument comprised of previously validated items. Original items from the following scales were adapted as needed during the process: TAM/C-TAM, TPB/DTPB; MPCU; IDT, MM, and SCT as well as constructs of BI, perceived voluntariness; the variable, usage behavior was a measure of frequency. The program PLS Graph: Partial Least Squares Structural Equation Modeling (PLS/SEM) was used to validate and assess the UTAUT's reliability. Specific indices included lower loading limits of .70; internal consistency values greater than .70; and communalities. Several iterations of PLS were run including three separate time intervals, controlling for voluntariness, and a series of tests including moderators of gender, age, and experience. Venkatesh, et al. (2003) initially examined the direct predictive relationships of seven independent variables to behavioral intention (BI) rather than intercorrelations between the constructs (Venkatesh, et al. 2003). Constructs representing computer self-efficacy, computer anxiety, and attitude toward technology were at first included in the model but later removed as insignificant predictors of behavioral intention. Lastly, use behavior as a dependent variable was examined based on its relationship to behavioral intention and facilitating conditions. The final results indicated that four constructs were found to directly predict behavioral intention and, subsequently, use behavior. The UTAUT model (Figure 1) identifies the relabeling of the four final constructs of performance expectancy, effort expectancy, social influence, and facilitating conditions as theoretical predictors of BI and UB. The final model, including moderating influences, accounted for 70% of the variance in Use Behavior.

Figure 1



Source: Venkatesh et al.

In addition to these theorized determinants, Venkatesh, et al. (2003) specified four key moderators influencing overall technology acceptance including gender, age, experience, and whether or not the use of the new technology was voluntary. The UTAUT model and scales were created using adapted items from the eight original theories discussed above. Each of the major determinants, along with the originating theories and constructs, will be presented in the following sections. We recommend that researchers fully consider the more complete underlying theories of each construct when conceptualizing future research studies.

Performance Expectancy (PE). Venkatesh et al. (2003) conceptually defined the first independent variable of the model, performance expectancy, as "the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). Performance Expectancy was created using items from the following constructs, perceived usefulness from the TAM/TAM2 and C-TAM-TPB; extrinsic motivation from the MM; job-fit (MPCU); relative advantage (IDT), and outcome expectations from the SCT scale. Table 1 shows the conceptual definitions form the original constructs leading to the final conceptual and operational definition of performance expectancy. While Venkatesh, et al. (2003) define PE within the parameters of *expected gains*, expectancy theory is broader and takes into consideration attitudinal dimensions related to perceived consequence, rewards, values, motivation, and likelihood of positive outcomes (Porter & Lawler, 1968; Vroom, 1964).

Table 1: Performance Expectancy

Original Constructs	Original Scale	Conceptual Definition	Source
Perceived Usefulness	TAM/TAM2 C-TAM-TPB	The degree to which a person believes that using a particular system would enhance his or her job performance.	Davis, 1989; Davis et al. 1989
Extrinsic Motivation	MM	The perception that users will want to perform an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay, or promotions.	Davis et al. 1992
Job-fit	MPCU	How the capabilities of the system enhance an individual's job performance.	Thompson et al. 1991
Relative Advantage	IDT	The degree to which using innovation is perceived as being better than using its precursor.	Moore & Benbasat, 1991
Outcome Expectations	SCT	Personal expectations related to the consequences of the behavior.	Compeau & Higgins, 1995b; Compeau et al. 1999

Effort Expectancy (EE). Effort Expectancy is conceptually defined as, "the degree of ease associated with the use of a system" and includes the constructs of perceived ease of use (TAM/TAM2), complexity (MPCU), and ease of use (IDT) (Venkatesh, et al. 2003, p. 450).

Table 2: Effort Expectancy

Original Constructs	Original Scale	Conceptual Definition	Source
Perceived Ease of Use	TAM/ TAM2	The degree to which a person believes that using a system would be free of effort	Davis, 1989; Davis et al. 1989
Complexity	MPCU	The degree to which a system is perceived as relatively difficult to understand and use	Thompson et al. 1991
Ease of Use	IDT	The degree to which using an innovation is perceived as being difficult to use	Moore & Benbasat, 1991

Social Influence (SI). Social Influence is comprised of items from the original TRA, TAM2, TPB, and C-TAM-TPB and is conceptually defined as, "the degree to which an individual perceives that important others

believe he or she should use the system" (Venkatesh, et al., 2003, p. 451). SI and subjective norms of a culture including values, behaviors, and group expectations are thought to be internalized over time and have been recognized as strong affective predictors of behaviors (Porter & Lawler, 1968). Venkatesh, et al. (2000) propose further that, "social influence has an impact on individual behavior through 3 mechanisms: compliance, identification, and internalization" (p. 452).

Table 3: Social Influence

Original Constructs	Original Scale	Conceptual Definition	Source
Subjective Norm	TRA; TAM2; TPB/DTPB; C-TAM-TPB	The person's perception that most people who are poor into him think you should or should not perform the behavior in question.	Ajzen, 1991; Davis, et al. 1989; Fishbein & Azjen, 1975; Mathieson, 1991; Taylor & Todd, 1995a, 1995b
Social Factors	MPCU	The individual's internalization of the reference group's specific interpersonal agreements that the individual has made with others, and specific social situations	Thompson et al. 1991
Image	IDT	The degree to which use of that innovation is perceived to enhance one's image or status and one's social system.	Moore & Benbasat, 1991

Facilitating Conditions (FC). Conceptually, the UTAUT construct facilitating conditions for PC use is, "the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (Venkatesh, 2003, p., 453). Originating theories regarding environmental conditions speak to organizational support - management, technical, and implementation - assistance designed to alleviate difficulties; positive facilitating conditions enhance the likelihood of use behaviors (Schultz & Slevin, 1975). Thompson et al. (1991) adapted items from Amoroso (1986) regarding facilitating conditions in terms of technology support; the resulting MPCU items were geared toward the availability of specific resource personnel.

Table 4: Facilitating Conditions

Original Constructs	Original Scale	Conceptual Definition	Source
Perceived Behavioral Control	TPB/DTPB, C-TAM-TPB	Reflects perceptions of internal and external constraints on behavior and encompasses us self-efficacy, resources, facilitating conditions, and technology facilitating conditions.	Ajzen, 1991; Taylor & Todd, 1995a, 1995b
Facilitating Conditions	MPCU	Objective factors in the environment that observers agree make an act easy to do,	Thompson et al. 1991

		including the provision of computer support.	
Compatibility	IDT	The degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters.	Moore & Benbasat, 1991

Behavioral Intention (Independent and Dependent Variables)

Studies of Behavioral Intention (BI) have their roots in social psychology literature beginning with general determinants of BI and extensions of predictors of BI to use technology. Throughout this paper we have reviewed the theoretical history of human behavior models and instruments that predict BI. We have also explored how BI subsequently directly influences user adoption and acceptance of technology; as such, BI has been studied as both and independent and dependent variable. Findings from each of the studies support the conclusion that BI has important direct and indirect impact on use. Each of the eight original technology acceptance models has also contributed to the development of a unified approach, UTAUT, to understanding and predicting BI and use. As a review, BI is predominantly influenced by perceived usefulness, performance and effort expectancy, social influences and facilitating conditions. Underlying these major constructs are concepts of subjective norms, system complexity, perceptions of value and usefulness, willingness to commit the required effort to engage with the innovation, self-efficacy, and other attitudinal measures.

Discussion

The UTAUT model highlights the importance of contextual analysis and how it helps in the development of organizational technology implementation (Venkatesh et al., 2003). Granted, each original model within UTAUT is able to predict behavior usage, but UTAUT's model provides direct determinants of intention to use (i.e. performance expectancy, effort expectancy, and social influence) as well two direct determinants of usage behavior (i.e. intention and facilitating conditions) (Venkatesh et al., 2003). Together, Venkatesh et al. (2003) found that the model accounted for 69% of the variance in usage intention, which was substantially more than any of the original eight models could have done alone. We assert that a holistic view of individual perceptions about technology only emerge if the complex range of possible moderators is considered and examined. With the development and validation of UTAUT, it has become the superior model that incorporates multiple aspects of intention and behavior; thus, the model has become the theoretical groundwork for future research in the area of technology acceptance in e-learning.

The UTAUT model captures the evolution of intention and behavior related to technology over time as well as moderating extraneous variables such as race, age, and gender. Previous research also suggests multicollinearity between gender and age; thus, these interactions need further examination (Levy, 1988). Venkatesh et al. (2003) also found that age alone moderates all of the primary relationships in UTAUT, however, attention to the correlation between age and technology acceptance is sparse. These authors also note that future studies exploring the influence of race, age, and gender with these variables should shift its focus to three areas: (1) identifying the "magic number" for age in which effects appear, (2) identification of underlying influential mechanisms, and (3) the importance of gender roles as a root cause for observed effects. Future research should also consider boundary conditions such as user groups, different organizational contexts, or different technologies. Investigations using additional extraneous variables may yield greater insight to technology adoption and usage.

Future research could also focus on the refinement of UTAUT scales and/or construct further validating the model and instrument with new and modified measures.

Without a doubt, computers affect the way that educators and their students teach and learn. In addition, technology is impacting how individuals manage and process vast amounts of available knowledge. The benefits to education have already been remarkable. Still, the expansive growth of educational technology represents significant changes to the traditional ways of communicating knowledge. Most importantly, educational technologies have the potential to meet the increased global demands for accessible education, to provide cost-effective education, and to enhance the quality and effectiveness of teaching and learning (Christensen, Horn, & Johnson, 2011). For instance, internet access has brought a world of information to us with a click of the mouse. Currently, multiple course delivery systems include all-inclusive educational websites, packaged software products, and communication tools, such as Blackboard, that allow students to connect and collaborate with others instantaneously (Cheung & Vogel, 2013; Ismail & Idrus 2010).

Even though the traditional face-to-face learning model continues to dominate education, society appears to have welcomed all things digital both in the classroom and beyond. However, while these innovations appear to offer enormous potential, they have also been met with resistance, frustration, and skepticism. As the use of educational technologies continue, there becomes a parallel need to uncover instructional and curriculum approaches that effectively unite the student with the technology tools. Naturally, it is not sufficient to invest in computers and technological equipment without thoughtful implementation plans and evidence-based empirical research to support learning. Instead, Jonassen (2003) suggests that the most efficient use for technology is when the device itself encourages active engagement in an activity and simultaneously enhances thinking and learning. Educational technology can contribute greatly to student learning. However, educators must be responsive to the increased demand for technology and its implications for teaching and learning. Educators need research that informs and allows them to recognize, acknowledge, and address distinctive instructional needs for student success with computer assisted learning modalities.

When it comes to educational technology, we may know where we are and what we want to achieve. The difficult question is how can we get there? Nationally, there is concern about the prudent use of educational technology. Technology has rapidly, maybe too rapidly, been positioned at all levels of education. The literature on change and diffusion of innovations has prepared the way for educators and scholars to study adoption, in general, and specifically with technology integration (Fullan, 2002; Rogers, 2003). The ultimate goal of any research is to achieve a clearer and more in-depth understanding of how individual perceptions influence the nature of behaviors over time. In regard to educational technology, educators must, first, clearly define the goals of using technology in learning. For instance, questions to ponder could include, is the intent to teach technology skills or content knowledge? Is the ultimate goal of implementing technology systems to infuse technology into current teaching practices? Is the goal to promote student-centered learning, effectiveness and student success?

In conclusion, current research suggests that educational technology programs can be designed to influence students' self-concepts and understanding of the value of technology. Models such as this can be used in various research settings to test the relationships between antecedent and posterior constructs of technology usage, user attitudes, integration intentions, and post adoptive behavior. Survey instruments can be used to augment attitude-based success measures such as user satisfaction. The provision of early feedback and remediation could result in students persisting in a course.

An important direction for future research is to examine acceptance and adoption within academic disciplines and newer online learning environments. Further, education researchers are beginning to layer the idea of social integration as a critical aspect of online learning. Researchers should examine whether certain educational platforms that may be perceived as useful are effective from an organizational perspective. Examples of these platforms could be the use of learning management systems (i.e. Blackboard, Moodle, Canvas, MOOCs).

The importance of this research track is clear as e-learning, online learning, and hybrid/blended learning course delivery in K-12 and higher education institutions has become a global phenomenon.

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