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# **The Technology Acceptance Model (TAM) as a Viable Model to Determine the Acceptance of E-learning Technologies in Higher Education Institutions (HEI's)**

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## **Abstract**

This paper analyzes the applicability of the Technology Acceptance Model (TAM), introduced by Dr. Fred Davis, as a model to determine the acceptance of E-learning technologies in Higher Education institutions (HEI's). There are many Colleges and Universities that are moving to the growing trend in the education industry considering e-Learning initiatives as a business opportunity. In order to implement e-Learning initiatives HEI's are adopting new technologies that enable educators, administrators and students to concur in a virtual environment in which they can manage at convenience the institutional resources. By the analysis of previous researches that uses the Technology Acceptance Model (TAM) as a viable model to determine the acceptance of e-Learning technologies in HEI's, I will determine if TAM is a successful model in predicting whether systems will be successful and can be used to evaluating systems throughout the system design lifecycle.

**Keywords:** Usability, Technology Acceptance, User perceptions, Technology

Acceptance Model, eLearning

## **Introduction**

Understanding why participants in the E-learning environment accept or reject a new information or communication technology has been probably one of the most challenging issues in the study of new technologies developed for Higher Education Institutions such as Colleges and Universities. By the use of the internet and the integration of new technologies, higher education institutions are developing e-Learning based academic programs and methodologies to evaluate the effectiveness, efficiency and the acceptance of their virtual initiatives.

This paper examines the use of the Technology Acceptance Model (TAM) as a viable model to determine the acceptance of E-learning technologies in Higher Education institutions (HEI's) based recent research in this new trend in the education industry.

## **Review of Literature**

The Technology Acceptance Model (TAM) originated from the psychological environment and expanded into the business settings. Adapted from the Theory of Reasoned Action (TRA), the Technology Acceptance Model (TAM) by Davis (1989) identified two distinct constructs, Perceived Usefulness and Perceived Ease of Use, which directly affect the attitude toward target system use and indirectly affect actual system use (Davis, 1993). Each of the factors is defined as follows:

- a. Perceived Ease of Use: the degree to which the individual users perceive that their use of the target system would be mentally and physically effortless (Davis, 1993).
- b. Perceived Usefulness: the degree to which individual users perceive that their use of the target system would increase their work performance (Davis, 1993).
- c. Attitude toward use of target system: the degree to which individual users would assess and relate their use of the target system to their job performance (Davis, 1993).
- d. Actual system use: defined as a form of external psycho-motor response that is quantified by individual users' real course of action (Davis, 1989).

## **Technology Acceptance Model**

The Technology Acceptance Model (TAM) represents an important theoretical contribution toward understanding Information Systems (IS) usage and Information

Systems acceptance behaviors (Malhotra & Galletta, 1999). The Technology Acceptance Model (TAM) is an adaptation of the Theory of Reasoned Action (TRA) to the field of IS. TAM posits that perceived usefulness and perceived ease of use determine an individual's intention to use a system with intention to use serving as a mediator of actual system use (Furneaux, 2006). The Technology Acceptance Model (TAM) was developed by Fred Davis, Paul Warshaw and Richard Bagozzi.

Based on the Theory of Reasoned Action (TRA), Davis, Bagozzi, and Warshaw, (1989) developed the Technology Acceptance Model which deals more specifically with the prediction of the acceptability of an information system. TRA and TAM, both of which have strong behavioral elements, assumes that when someone forms an intention to act, that they will be free to act without limitation. As theorist, they developed the TAM model supported by the hypothesis that the beliefs, attitudes, and intentions are important factors in the adoption of computer technologies, while contemporary representations have focused on explaining the act of using computers. They presented that the role of learning to use the computer needs to be better understood within the overall adoption process (Davis, Bagozzi, and Warshaw, 1992). The purpose of this model is to predict the acceptability of a model and to identify the modifications which must be brought to the system in order to make it acceptable to users.

The Technology Acceptance Model (TAM) is used by Management Information Systems (MIS) practitioners to predict the success or a failure of an information systems project. The TAM is based on the following assumptions; (a) when end users perceive the target system as one that is easy to use and nearly free of mental effort, they may have a favorable attitude toward using the system, (b) when end users perceive the system as one

that is helpful to their job, then they may have a positive attitude toward the system used and (c) when users have a favorable attitude toward the target system, they may use the system frequently and intensely, which means that the system developed is successful (Cheng-Chang, Sivo, Gunter & Cornell, 2005).

TAM is used to address why users accept or reject an IT system and how user acceptance is influenced by system characteristics across users perceptions and their attitudes toward the system. This will enable system designers, developers and end-users to improve user acceptance of the system in the workplace through the design choices of the system (Al-Gahtani, 1998). TAM is a solid theoretical model where its validity can be operationalized and extend to knowledge and learning as an important step towards a better understanding of the user behavior on the IS in any organizational environment (Saadé, Nebebe, & Tan, (2007). Given TAM's low cost and ease of application, developers could easily collect data at various points during system development and monitor shifting user attitudes about the system as it moves from conceptual design stages to actual implementation (Morris, & Dillon, 1997).

#### A. Perceived Usefulness

Perceived usefulness in the TAM model was originally defined as the extent to which a person believes that using a system would enhance his or her job performance and effectiveness (Davis, 1989). Perceived Usefulness is a construct tied to an assessment of the benefits that accrue to an individual or organization by using the technology, while perceived ease of use is tied to an individual's assessment of the effort involved in the process of using the technology (Ndubisi, 2003). Perceived usefulness is the extent to which a person believes that using a particular technology will enhance his

or her productivity and performance. (Davis, 1989). Perceived usefulness is a construct tied to an assessment of the benefits that accrue to an individual or firm by using the technology, while perceived ease of use is tied to an individual's assessment of the effort involved in the process of using the technology.

Measures of perceived usefulness of Information Technology (IT) are commonly used in terms of increase in productivity, improvement in job performance, enhancement of job effectiveness, and usefulness in the job. Perceived ease of use is measured in terms of how clear and understandable interaction is with the system, ease of getting the system to do what is required, mental effort required to interact with the system, and ease of use of system. Davis (pages 319-339) developed the Perceived Usefulness construct under the following benefits of usage; (a) it would enable users to accomplish tasks more quickly, (b) it would enable users to improve their performance, (c) it would increase their productivity, (d) it would enhance their effectiveness, (e) it would make it easier to do what users wants to do and (f) users would find it useful.

According to Ndubisi, et al, (2003) perceived usefulness has been reported to have the most important influence on information technology (IT) usage. The determinants of perceived usefulness have been studied by a number of IT researchers from system design characteristics, to organizational factors, environmental forces, and demographic variables.

## B. Perceived Ease of Use

Perceived ease of use refers to the extent to which a person believes that using a system would be free of mental effort (Davis, 1989). This is another major determinant of

attitude toward use in the TAM model. Davis et al. (1989) found that ease of use is an important determinant of system usage operating through perceived usefulness. Perceived Ease of Use also refers to the degree that, by using a technology will be the basis for predicting end-user acceptance of computer technology (Lopez & Manson, 1997). Davis (pages 319-339) on the other hand developed the Perceived Ease of Use construct under the following benefits; (a) it enables learning to operate it would be easy for the user, (b) users would find it easy to get it to do what they want it to do, (c) users interaction with it would be clear and understandable, (d) users would find it to be flexible to interact with (e) it would be easy for the users to become skillful at using it and (f) users would find it easy to use. Despite the Technology Acceptance Model (TAM) can be considered that uses two distinct believes, both are interrelated between both constructs (Lopez & Manson, 1997).

#### C. Attitude Toward use of Target System

Attitude has long been identified as a cause of intention. Adapting this general principle, attitude toward use in the TAM model is defined as a mediating affective response between usefulness and ease of use beliefs and intentions to use a target system (Phuangthong, & Malisawan, 2005). Attitudes play a central role in the system to value causal chain due to its power and functionality. Al –Gahtani, et al, (1998) also presented that the Attitude toward using the system refers to the persons' general feeling of favorable or unfavorable for the use of spreadsheets.

#### D. Actual system use

The Actual System Use as a behavior consists of the number of times of systems use. Actual system usage is operationalized in terms of frequency of use of (Davis, 1989,

1993; Malhotra and Galletta, 1999). Many studies that empirically tested the TAM did not examine actual system use, which had been identified as a construct in the original TAM's path model (Park, 2009). Given that numerous academic institutions are currently employing electronic courseware to support teaching and instruction in higher education, an examination of the relationship between the current usage of electronic courseware and behavioral intention to use the system in the future would shed light on the future adoption patterns of electronic courseware (Park, Lee & Cheong, 2007).

### **E-Learning**

It is evident today that the use of Internet technologies has significant impacts on every aspect of people lives. In the context of education industry more and more higher education institutions have come to realize the potential impact of using the Internet in the classroom as part of the learning environment (Saadé, Nebebe, & Tan, 2007). E-learning technologies, also known as virtual learning environments, are systems that use modern information and communication technology to support education and training efforts. E-learning consists of a repository for courses, manuals, exercises, interactive options and also, mass communication functionalities that can assist the study process of individuals or groups of students (Poelmans, Wessa, Milis, Bloemen & Doom, n.d). The recent technology infusion has caused participation and communication methods in traditional university classrooms to change. In this context, the use of electronic learning or e-learning is increasingly prevalent in many higher educational institutions (Masrom, 2007) and despite E-learning is not intended to replace the traditional classroom setting, as a technological initiative provides an additional opportunity for interaction and communication between students and their professor.



With e-learning, the possibilities for getting knowledge and information out to the learners at their own pace opened a whole new world for knowledge transfer. In recent years terminology changed and it went from using such terms as technology-supported learning, distance learning and distance education to online learning and web-based training to e-learning (Carabaneau, Trandafir, & Mierlus-Mazilu, 2005). Today, e-learning allows us to share and manage knowledge and skills of the professionals who work in our colleges and universities, and to get the right information to the right people, when and how they need it.

The benefits e-learning are commonly recognized and can bring to both, students as well their professors, particularly stem from the facilitated information exchange and the more collaborative learning. Implementing an E-learning initiative in a Higher Education Institution will have the potential to improve service quality, the access to education and training, while at the same time reducing costs and improving the overall cost-effectiveness of educational services, in addition e-learning brings more power to its users, in order to become more interactive rather than being passive listeners (Jung, Loria, Mostaghel, & Saha, 2008). But, according Mi-Ryang Kim (2008) as published in *Factors Influencing the Acceptance of e-Learning Courses for Mainstream Faculty in Higher Institutions*, despite this advantages and growth, professors in many higher education institutions that are well equipped with e-learning technologies are still reluctant to use them on a widespread basis in their teaching.

### **Trends in e-Learning Systems**

Among the various new trends in e-learning systems, electronic course management software has been one of the most widely disseminated technologies in U.S.

colleges and universities (Park, Lee & Cheong, 2007). For instance, private virtual learning systems such as Blackboard (<http://www.blackboard.com>), WebCT (<http://www.webct.com>) and eCollege ([www.eCollege.com](http://www.eCollege.com)) have been adopted by numerous academic institutions (p. 106). Another actual trend involves blended learning programs. The term blended learning has come to describe a well thought-out combination of e-learning and other traditional training methods. The combination is meant to increase effectiveness in the process of learning, due to the fact that a single delivery method is no longer sufficient to handle all training needs. Blended learning has the advantage that preserves the necessary consideration of how people learn, but in the same time offers options for learning and produce measurable savings in learning offerings promised by e-learning (p. 111).

### **TAM Scholar Research Case Study**

The following are two case studies that analyses how viable the Technology Acceptance Model (TAM) in order to evaluate the acceptance of technologies by its users in an education environment.

The Technology Acceptance Model (TAM) was applied as a diagnostic tool to evaluate how Public Relation students from Hawaii and Kansas that were assigned to use online technologies to communicate with each other as well as cultural consultants in Korea adapt and extend the model in a globally linked PR classes (Kelleher, O'Malley & Oh, 2003). TAM posits relationships among the following variables; (a) perceptions of the ease of using technology, (b) perceptions of usefulness of technology, (c) intentions to use technology, and (d) the actual usage behavior. Earlier studies in this specific line of

research sought ways to use online technologies to improve learning outcomes in communication campaigns and public relations classes (p.2).

Earlier studies in this specific line of research sought ways to use online technologies to improve learning outcomes in communication campaigns and public relations classes. Aside from testing the proposed model, the major purpose of this research was to see how student intentions to use online technologies in their future careers were affected by the main TAM variables. For this research all students were asked to complete an online survey questionnaire before the project started the questionnaire consisted of Likert-type items that were scaled to represent the constructs and variables mentioned before (p.9).

The model was found to fit particularly well with student attitudes and behaviors related to online Bulletin Board Systems (BBSs) used in the class project. After completing the project, students' perceptions of the usefulness of BBSs became a significant antecedent of their intentions to use BBSs in their future careers, and perceived ease-of-use became less important in terms of future career intents, apparently as a result of the project. The researchers also concludes that TAM model can be helpful to scholars in order to determine how to teach technologies by focusing on their usefulness to the task at hand, thereby making the technology important to the students in class and in their future careers in a globally linked but culturally diverse work world (p.16).

Other area in which has extended the theory is in the application the Technology Acceptance Model (TAM) to educational hypermedia (Gao, 2005). The reference article applies the Technology Acceptance Model (TAM) to an online course companion site of

a textbook to be used by participants in this study. The study main objective was to study the relationships among the following variables; (a) perceived ease of use and its relation to perceived usefulness, (b) perceived ease of use and its relation to the attitude toward using, (c) perceived usefulness and its relation to attitude toward using, (d) perceived usefulness and its related to intention to use, (e) attitude toward using and its relation to the intention to use and (f) intention to use and its relation to actual use.

The researcher conducted a field study in order to evaluate the application of TAM to one type of educational hypermedia, a course companion site related to a textbook that was to be used by junior and senior students in the information systems major of a northeastern college in the US. The website contained a section of study guides, through which a student could review the key concepts of each chapter and take practice tests generated randomly from a test bank, and then have these tests graded. Results suggested that TAM is overall an effective tool for predicting user acceptance of such web-based course support systems and for evaluating competing hypermedia-based educational products.

The Technology Acceptance Model (TAM) was developed to explain computer usage behavior (Rao, n.d.). This concept later found applications in studying adoption of consumer products like Cellular phones, PDA's, personal computers and even workstation. We can concluded that, based in the analysis done in this paper that, despite the industry, its variables and methodological approach, TAM is a powerful

## **Conclusion**

According the literature, the Technology Acceptance Model (TAM) has been shown to be a valid mean of predicting system acceptability (Masrom, 2007). It suggests

that user perceptions of a system are formed very early, after only minimal exposure to the system (Al-Gahtani, et al, 1998; Davis, Bagozzi, & Warshaw et al, 1992; Malhotra, & Galletta, et al, 1999). Nonetheless, these early perceptions have a very powerful influence on whether users will actually use that system in the future. In particular, TAM suggests that designers must consider not only the system's ease of use, but also its usefulness in order to encourage end user acceptance of that system (Morris, & Dillon, 1997).

Despite its relative simplicity, TAM has been shown to be viable and extremely successful in predicting whether systems will be successful. Because of its simplicity, it offers designers a cost-effective model which can be used to evaluating systems throughout the system design lifecycle. In addition, Higher Education Institutions have the challenge to migrate to e-Learning using this verified model for implementation (Kim, 2008).

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