

USING SIMULATION TO UNDERSTAND THE IMPORTANCE OF TAM AND COLLABORATIVE LEARNING IN IMPROVING PERFORMANCE: AN EXPERIMENT WITH POST GRADUATE MANAGEMENT STUDENTS – BANGALORE

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ABSTRACT

This study focuses on adoption of simulation system in rapidly changing technology and information flow. This paper addresses how simulation system enhances student collaborative learning and learner performance using Technology Acceptance Model. Results were analyzed using Regression Modeling technique. The results revealed the mediating role of Collaborative learning in the relationship between student's acceptance to technology and his/her performance. The results indicate that simulation system serves as a dynamic tool to accelerate the progress of learning environments by encouraging collaboration and communication among students which strengthen their learning abilities and increase performance. In the competitive world, simulation system should be implementing at education level so that students can learn more before entering into a real-life career.

Keywords- Simulation, Acceptance to Technology, Collaborative Learning and Performance, Post Graduate Students, India.

INTRODUCTION

This paper studies the relationship between Acceptance to technology, Collaborative learning and learner's performance.

Fred Davis introduced technology Acceptance Model (TAM) in 1986 for his doctorate proposal. An adaptation of Theory of Reasonable Action, TAM is tailored for modeling users' acceptance of information systems or technologies

Why TAM is important for the corporate world:

Industry is facing challenges due to semi-skilled and unskilled work force. The world workforce need to be updated and upskilled to meet the challenges .Industry encounters several challenges due to lack of skills like: High staff turnover, Challenge in creating innovative teams , formation of Silos , and problems with employee engagement. Research says that 35% of workforce needs to change by 2020. The constant need to ensure our workforce is up to date on the latest trends, knowledge and skills is a big challenge facing managers today. One of research data tells that, it takes 33% of an employee's annual salary to replace them (that goes up to a whopping 400% for expert senior staff).

The above challenges can be overcome by using the Simulation technique and by teaching this technique to the students; this will increase the adaptability and flexibility of students.

LITERATURE REVIEW

Use of simulation system (games, applications, and situation) has grown significantly over the last 20 years that enhances the learner's capability to solve the problems (Douglas, Miller, Kwansa, & Cummings, 2007; Jones, 1998; Rosen, 2008). The simulation system is an artificial environmental situation in which learners perform their duties in the real world scenarios (Gredler, 2004; Jones, 1998).

In the research, paper of "Global Knowledge, Memory and Communication "technology acceptance model and social network sites (SNS) a selected review of literature .

(Suren Weerasinghe MainLibrary, University of Peradeniya.), the purpose of this paper is to conduct a systematic review of studies that have used the technology acceptance model (TAM) in the context of social network sites (SNS). It describes various studies undertaken to examine user behaviors and attitudes towards networking sites.

Social media is "a group of Internet-based applications that build on the ideological and technological foundations of Web and that allow the creation and exchange of user generated content" (Kaplan and Heinlein, 2010,p.61). According to Kaplan and Heinlein (2010, p.60),there are six types of social media: (1) "collaborative projects" (2) "blogs" ,(3) "content communities" (4) "social network sites"; (5) "virtual game worlds" and (6) "virtual social worlds".

Social network sites Boyd and Ellison(2007,p.211) define SNSs as a "web-based services that allow individuals to: construct a public or semi-public profile within a bounded system; articulate a list of other users with whom they share a connection with ; and view and traverse their list of connections and those made by others within the system.

SNSs are a part of the second-generation internet applications, which refer to as social web (Constantinides et al., 2013). Users can create personal information profiles on SNSs, invite others to access those profiles and send emails or instant messages between each other (Kaplan and Haenlein, 2010). Furthermore, Durdenetal.(2007) assert that social networks are vital for the well-being of humans. SNSs cater to a wide variety of users and these sites vary according to the degree to which they integrate new information and means for communication such as mobile connectivity, blogging, podcasting, email capabilities, video and photo sharing (BoydandEllison,2007;Rosenand Sherman,2006).

Examples of SNSs include MySpace, Facebook, Cyworld, Bebo, work-related contexts such as LinkedIn, content SNS like Slide share and Flickr as well as micro SNS such as Twitter. Students who are comfortable with SNS have higher probability of acceptance of technology.

TAM is the theoretical extension of TRA. TRA posits that a person's intention to perform a given behavior is a direct determinant of his/her actual performance. TAM has 2 important variables

PEOU (Perceived Ease of Use) and PU (Perceived usefulness) in a complex relationship between system characteristics which is based on Theory of Reasonable Action (TRA) and Theory of planned behavior (TPB) PU is the degree to which person believes using particular system would enhance his/her performance.

TAM applications in social networking sites context:

TAM is one of the most prominent models in information technology acceptance research and "so far the prevailing theoretical approach regarding users' adoption of social media" Lane and Coleman(2012)also confirmed the existence of a strong relationship between TAM and social networking media.

- A survey was performed among a sample of 1,100 business students at a regional US university to collect data. It was found that PEOU a significant determinant of PU, and PU was a significant determinant of the usage, thus the findings confirmed the established TAM relationships. It was revealed that students that

are more autonomous were the ones who found social networking media more difficult to use and eventually valued this social networking platform as less useful.

- Curran & Lennon (2011) developed a model with 5 antecedents beliefs
 1. Ease of use
 2. Usefulness
 3. Enjoyment
 4. Social influence
 5. Drama

Because of all these factors people had started considering and recommending this model.

This attempts to gain insight on various changes into model by different researches in SNS.

Besides 5 constraints even the personal traits as autonomy, demographic like age, gender also acts as moderators to determine SNS adoption.

According to psychological theory, TAM has evolved to become a key model in understanding predictors of human behavior toward potential acceptance or rejection of technology. Attitude and intention whether positive or negative are very important.

There are lot more surveys based on this.

A number of theories have proposed to explain consumers' acceptance of new technologies and their intention to use.

- Technology readiness (TR) refers to people's propensity to embrace and use of new technologies for accomplishing goals in home life and at work (Parasuraman and Colby, 2001). Based on individual's technology readiness score and the technology readiness, Parasuraman and Colby (2001) further classified technology consumers into five technology readiness segments of explorers, pioneers, skeptics, paranoids, and laggards.

- According to Goodhue et al. (1995), Task-technology Fit (TTF) emphasizes individual impact. Individual impact refers to improved efficiency, effectiveness, and/or higher quality.

- The Theory of Reasonable Action (TRA) (Fishbein and Ajzen, 1975), is one of the most popular theories, used and is about one factor that determines behavioral intention of the person's attitudes toward that behavior. Fishbein and Ajzen (1975) defined "attitude" as the individual's evaluation of an object and defined "belief" as a link between an object and some attribute, and defined "behavior" as a result or intention.

- Ajzen (1991) developed Theory of Planned Behavior which is about one factor that determines behavioral intention of the person's attitudes toward that behavior. The first two factors are the same as Theory of Reasonable Action (Fishbein and Ajzen, 1975). The third factor that is known as the perceived control behavior is the control which users perceive that may limit their behavior.

- Decomposed TPB introduced by Taylor and Todd (1995). The Decomposed TPB consists of three main factors influencing behavior intention and actual behavior adoption, which are attitude, subjective norms and perceived behavior control.

- Venkatesh formed the final version of Technology Acceptance Model and Davis (1996) after the main finding of both perceived usefulness and perceived ease of use found to have a direct influence on behavior intention, thus eliminating the need for the attitude construct.

- TAM2 theorizes that users' mental assessment of the match between important goals at work and the consequences of performing job tasks using the system serves as a basis for forming perceptions regarding

the usefulness of the system (Venkatesh and Davis, 2000). The results revealed that TAM 2 performed well in both voluntary and mandatory environment.

- Venkatesh and Bala (2008) combined TAM2 (Venkatesh & Davis, 2000) and the model of the determinants of perceived ease of use (Venkatesh, 2000), and developed an integrated model of technology acceptance known as TAM3 shown in Figure 9. The authors developed the TAM3 using the four different types including the individual differences, system characteristics, social influence, and facilitating conditions which are determinants of perceived usefulness and perceived ease of use.
- Venkatesh, Morris, Davis (2003) studied from the previous models/theories and formed Unified Theory of Acceptance and Use of Technology (UTAUT).

The development of the new theoretical research framework will depend on a number of factors but are not limited to the research problems and objectives, gap analysis, the target market (users or developers, etc), the organizations' goals and the understanding of technology adoption models and theories based on the available materials and others. Such understanding is vital to enable the interested parties (e.g: students, academics, researchers, government, organizations) to relate with both the theory and practical aspects of the technology adoption models and theories.

The increasing importance of e-health has raised the significance of exploring the factors influencing the users' acceptance of e-health applications. There has been an extensive usage of the technology acceptance model (TAM) in e-health applications acceptance research. However, not all TAM relationships are borne out in all the studies. There is a variation in predicted effects in several studies with different user type and application type. This research aims to bridge a research gap by providing a holistic view of the e-health applications acceptance research by integrating the findings of existing relevant literature.

A statistical meta-analysis of the effect size of causal relationships between common TAM constructs was conducted on 111 peer-reviewed academic studies published in various journals.

Review Process consists of

- Protocol development
- Inclusion Decision
- Final Selection
- Data Extraction and Synthesis

Thus, it was concluded that the TAM is an appropriate choice to study the e-health applications acceptance. The effect sizes for the relationships PEOU→PU, PU→BI, and PU→ATU were found medium and for the relationship, ATU→BI was found large. Effect sizes for the relationships PEOU→ATU and PEOU→BI was found small.

As many Korean universities have recommended the implementation of mobile learning (m-learning) for various reasons, the number of such tertiary learning opportunities has steadily grown. (Sung Youl Park, Min-Woo Nam and Seung-Bong Cha)

A sample of 288 Konkuk university students participated in the research. The process by which students adopt m-learning was explained using structural equation modeling technique and the Linear Structural Relationship (LISREL) program. The general structural model based on the technology acceptance model include m-learning self-efficacy, relevance for students' major (MR), system accessibility, subjective norm (SN), perceived usefulness, perceived ease of use, attitude (AT), and behavioral intention to use m-learning.

This study used TAM as a theoretical framework of university student's' m-learning acceptance and intention to use. The study objectives were to develop a general linear structural model of m-learning acceptance of university students that would help school managers and educators implement m-learning and analyze the relationship of university students' behavioral intention (BI) In addition, some descriptive statistics related to m-learning use and those selected factors were also determined.

Questionnaire Composed of four parts. Part I was designed to identify the demographic attribute of the respondents. The questions in Parts II, III and IV were not only made based on Davis's prior studies with modifications to fit the specific context of the m-learning but were also mainly adapted from the four prior studies for the study objectives: Park (2009), Ndubisi (2006), Lee, Cheung and Chen (2005) and Malhotra and Galletta (1999). Part II consists of the following four subsections: PE, PU, AT and BI.

This study adopted SA as an organizational factor and SN as a social factor. In addition, m-learning SE (SA) and MR as individual factors were included. The study results also demonstrated TAM constructs had both direct and indirect effects on university students' BI to use m learning.

This paper varies as few students had the mobile access before the survey and few do not have.

This study examined the perceived learner performance from the use of simulation system in a collaborative environment using Technology Adoption Model (TAM).

Theoretical Framework

Technology Acceptance Model (TAM) is derivative of Theory of Reasoned Action (Ajzen & Fishbein, 1980) illustrate that the behavior of individual changes after adoption of new technologies. TAM has two main constructs: perceived usefulness and perceived ease of use. Perceived usefulness is defined as "the degree to which a person believes that using a particular system may enhance his or her job performance" (Davis, 1989). Perceived ease to use Perceived ease of use is defined, as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989). Perceived enjoyment is defined as "the degree to which the activity of using technology is perceived to be enjoyed in its own, right apart from any performance consequences that may be anticipated"(Davis et al., 1992).

Simulation system

Simulation is a reliable and exciting system which provides students learning-based experience which motivates and encourage them to learn.. Mawhirter and Garofalo (2016) stated that simulation systems are the creative and innovative way to increase students' interest in learning. Simulation system not only helps students in reducing stress but also assist in knowledge retention (Popil & Dillard-Thompson, 2015).

COLLABORATIVE LEARNING

Collaborative learning can be defined as two or more people working together to create or achieve a particular objective. Collaborative learning encourages institutes to think out of the box and also help people to learn and innovate (Lytras et al., 2015).

LEARNER'S PERFORMANCE

Many studies show that simulations improve the learning performance of individuals (Gaba, Howard, & Fish, 2001; Grantcharov et al., 2004; Shapiro et al., 2004). Simulation system prepares learners to deal with unanticipated events, which in turn increase their confidence in real-world work performance. Madge, Meek, Wellens, and Hooley (2009) urged that use of this technology can work as a bridge between learners, instructors, and other participant.

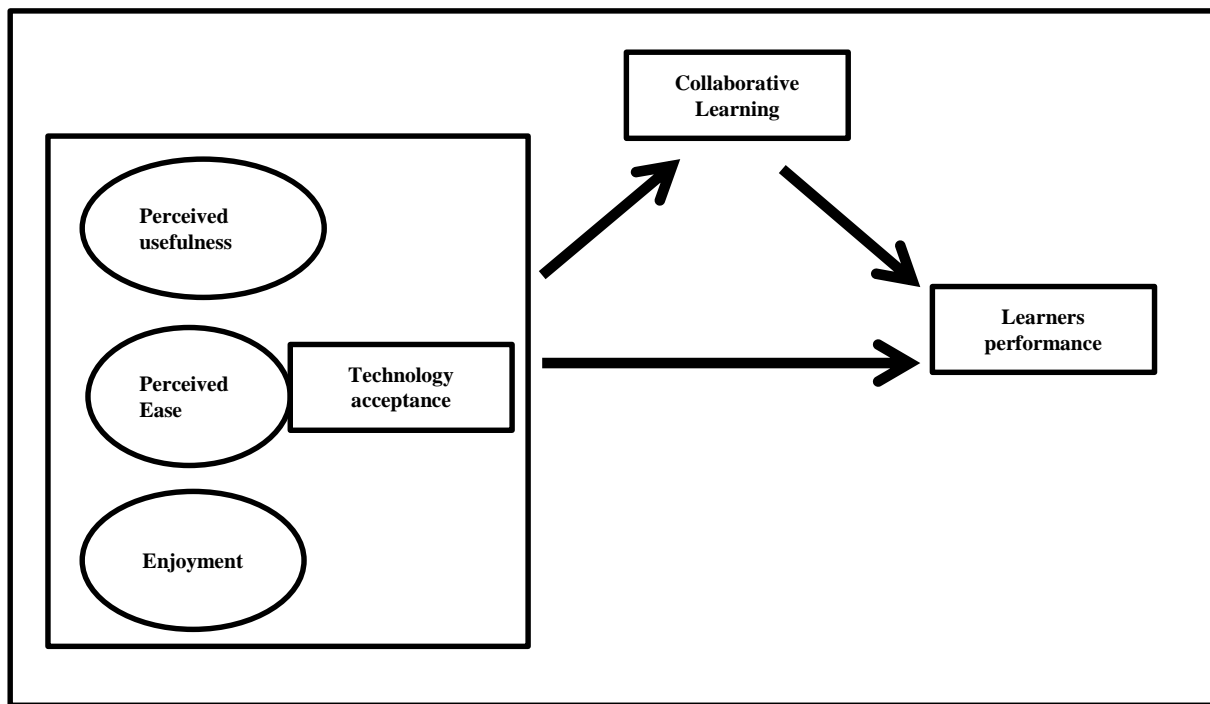


Figure : Model to be tested

RESEARCH METHODOLOGY

This research measures the effect of perceived enjoyment, collaborative learning from simulation system which results in learner performance using Technology Acceptance Model. To perform statistical analysis, data were collected from post-graduate Management students of two different sections, who know stimulation games/system. 150 questionnaires were circulated among students out of which 110 surveys were found accurately filled. Validated questionnaires were selected to take the response, such as perceived usefulness and perceived ease of use (Davis, 1989) (reliability alpha- .73), perceived enjoyment (Young-Gul Kim, 2001) (Moon & Kim, 2001) (reliability alpha- .78), collaborative learning (Fraser & Treagust, 1986) (reliability alpha- .83), with modifications of words and sentences in accordance with the current study. Individual learner's performance was reported at the end of the stimulus game. Seven Likert scales are used where one strongly disagrees, four neutral, and seven strongly agree.

RESEARCH QUESTION

1. Is technology acceptance is directly significant to the performance of the student.
2. Whether collaborative Learning mediates Technological acceptance as well as the performance of the student

HYPOTHESES

Hypothesis 1. If the technology acceptance in a student is high then his performance is also high.

Hypothesis 2. If the Technology acceptance of a student is high then his collaborative learning is also high.

Hypothesis 3. If the technology acceptance of a student is high then his collaborative learning as well as his performance both are high

DATA- ANALYSIS

Data was collected from the classified respondents, according to gender, education, the field of Study and the students who know simulation system/systems. Gender was classified as male and Female; respondents were 63 and 37% , respectively.

The data was analyzed using regressions in SPSS Version 21.

		Path	Model Sig	Variable Sig	R	Ajd R-Sq	SE
Model 1	Step 1	c	0.010*		0.31	0.09	0.017
Model 2	step 2	a	0.001**		0.39	0.16	0.039
Model 3	Step 3	b	0.000	0.000***	0.51	0.25	0.043
	Step 4	c'	0.003				0.036

Table : Regression Analysis of the Model

The aim of the study was to assess the predictive relationships between Acceptance to Technology and collaboration learning toward Learner's performance. The regression analysis model tested the hypothesis that Acceptance to technology would predict performance directly, and Acceptance to technology would predict collaborative learning which in turn would predict performance.

DISCUSSION

The primary aim of this study is to examine the impact of simulation system on the learning performance of the students. The research was performed on students who belonged to different fields to determine the learning performance of the students with a simulation system. The result of the study revealed that student-learning performance improves by using simulation system, by involving them in collaborative studies in groups, easy to use system, useful and fun learning environment.

Simulation system provides a collaborative environment, which enhances learning performance of students. The simulation system is an opportunity for students to build a number of skills to work in groups like leadership skills, teamwork skills, conflict management skills, and negotiations skills, and learn from each other. According to Wood, Beckmann, and Birney (2009), learning leadership skills, teamwork skills, conflict management skills, and negotiations skills helps students in their practical workplace where people from different areas, culture, and personalities are working together.

Simulation system allows students to link theory with practice. Simulation system can enhance students' learning performance by adopting different strategies for the implementation of various approaches and logic. Simulation systems allow students to learn how they can apply these theories and concepts in the practical workplace, which could generate better results for them.

Simulation-based studies are a useful, easy, and fun way of learning, which help students to think critically. There is a need to shift from traditional model of instruction (for examples lectures) to learner-based models, that support students to learn more while engaging themselves in the practical implication of theories. Simulation-based studies are considered as the supplement in classrooms learning, that enhances collaboration among students, and they involve and help each other in the learning process (Otting, Zwaal, & Gijsselaers, 2009).

Educators should put their efforts to generate students' attention and interest towards the studies. It is essential for educators to use simulation-based learning method so that students can get a better understanding of theory in a comfortable and fun environment. According to Pratt and Hahn (2016), fun elements maximize the learning process. Educators should take feedback from students regarding usefulness, easiness, and learning, so that course can be modified accordingly.

There are lots of challenges in the implementation of simulation-based learning. There is a need to train educators and instructors to learn new technologies and method of teaching so that they can enhance students' creativity and learning performance. People are always reluctant to adopt a new way of doing things, so there is a need to create awareness of simulation system adoption and its benefits for both students and instructors. Future research can be done in different departments to test the change in intention and attitude to adopt the field of study in which they used simulation system and how simulation system motivates and encourages students to choose the field of education in which they use simulation system.

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