

# TOWARDS AN EDUCATION BEHAVIORAL INTENTION MODEL FOR E-LEARNING SYSTEMS: AN EXTENSION OF UTAUT

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## ABSTRACT

E-learning has continued to gain the interest of enterprises and universities. As an organization's deployed e-learning systems grow, it is important for researchers to evaluate the performance of those systems. With the growing trend toward web-based learning systems, behavioral intention models (such as TAM, TPB, TAM2 and UTAUT) seem particularly helpful to examine whether and why people use e-learning technologies.

Prior research has presented various perspectives on individual difference, which mostly focused on demographic variables, such as age, gender, education and individual experience. It is not easy to clarify the cross-effectiveness and redundancy among these demographic variables. In this study, learning and teaching styles are regarded as cognitive individual differences in adopting e-learning systems. Matching teaching and learning styles improves learning, attitudes, behavior and motivation.

The proposed model, EduBIM (Education Behavioral Intention Model), focuses on the degree of correspondence between students' perceived learning and teaching styles, which together directly moderate the intention and usage of e-learning systems. This study enriches the UTAUT model by integrating cognitive individual differences to synthesize the effects of demographic moderators. This model will enable researchers to evaluate behavioral intention toward e-learning systems and to propose further studies on system acceptance.

**Keywords:** *Learning Styles, Teaching Styles, Individual Difference, UTAUT, Behavioral Intention Model, e-Learning System*

## 1. INTRODUCTION

Enterprises and universities are increasingly focusing on e-learning and have accumulated a great deal of experience over the past few decades in applying ICT (information and communication technology). However, e-learning systems are still new to many organizations. Therefore, such organizations face new challenges in constructing e-learning management systems and even more challenges in integrating such systems into existing enterprise-wide information systems. Many studies in the Information Systems (IS) field have investigated explanatory models in adopting technologies that help understand and predict users' adoption and usage behaviors. Among them, users'

attitudes and intentions are dominant factors, consequently leading to gains in information system performance.

Among these models, the Technology Acceptance Model (TAM), theoretically derived from Fishbein and Ajzen's Theory of Reasoned Action (TRA), emphasizes users' beliefs, attitudes and intentions in adopting technology [7][8]. Two major determinants further define the belief constructs: users' perceived usefulness and the perceived ease of use. Integrated with attitude and intention, those determinants form a causal chain that demonstrates users' adoption of systems.

However, while most previous studies mainly demonstrated the typical factors related to



individual differences, including age, gender, education and experience, which significantly determine system adoption. However, little attention has been devoted to examining cognitive individual differences in adopting information systems. Farida and Sridhar (2009) proposed a new e-learning acceptance model (ELAM), which is based on UTAUT, applied learning styles and teaching styles as individual difference mediators and they investigated possible differences in e-learning behavior [9]. Lu and Lin (2012) proposed another improved model that incorporates learning styles and teaching styles and is based on TAM [26].

In this paper, the literature review will be conducted in the initial step explore existing studies and construct the theoretical foundation. After thoughtful and dialectical analysis, an integrated theoretical model will be proposed to highlight the key concepts and implications. Hence, this study modifies the aforementioned models and uses a learning-teaching style fit factor calculated by students' learning style and perceived teaching style to explore students' adoption and usage of e-learning systems.

## 2. LITERATURE REVIEW

### 2.1 A Review of Behavioral Intention Models

Behavioral intention research investigates explanatory models for adopting technologies; these models help us to understand and predict adoption and usage behavior. Among them, users' attitudes and intentions are dominant factors that consequently lead to gains in information system performance. In behavioral intention research conducted over the past decade, the Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB) and Unified Theory of Acceptance and Use of Technology (UTAUT) are the most prevalent theoretical models for explaining individual adoption of technologies. These theoretical models share the same belief-attitude-intention-behavior causality, which is widely supported in numerous empirical studies.

The UTAUT, proposed and validated by Venkatesh et al. (2003), integrated eight models, including TRA (Fishbein & Ajzen, 1975), TAM, the Motivational Model (MM), TPB, TAM and TPB combined, the model of PC utilization (MPCU), the innovation diffusion theory (IDT) and the social cognitive theory (SCT). The UTAUT model has been demonstrated to be up to 70% accurate at predicting user acceptance of

information technology innovations, which is significantly higher than the prior models, thus making the UTAUT a superior metric [28][37].

After reviewing and assessing models of behavioral intention, including TAM, TAM2, TPB and UTAUT, this research builds a new conceptual model to explain the effect of teaching styles and learning styles on the level of acceptance and use of e-learning systems. The proposed research model integrates the above-mentioned constructs to understand system adoption more thoroughly and evaluates e-learning management systems in higher education.

Individual difference is regarded as a dominant factor in the adoption behavior of information systems. David & Detmar (1997) reported gender differences that might relate to beliefs and the use of computer-based media [6]. Lu et al. (2000) examined how differences in cognitive style can affect the usage behavior of decision support systems (DSS). Because of the variety of perspectives used to differentiate individuals, meaningful difference factors are chosen based on their relevance to the characteristics of the research subject, namely, web-based learning.

### 2.2 Learning Styles

Bostrom, Olfman and Sein (1990) stated that learning styles affect end-user training projects [4]. Specifically, they found that learning styles defined through demographic variables affected teaching and learning processes. A number of experiments in educational research have also examined three widely accepted theoretical models in learning styles: Kolb's model, Myers-Briggs and Felder-Silverman's model.

Kolb's (1984) Learning Styles Inventory model classifies learners into four different styles by two dimensions of thinking preferences [20]. The first dimension ranges from concrete experience to abstract conceptualization and the second dimension extends from active experimentation to reflective observation. The resulting four categories are as follows:

- Type1.** Preferences for concrete experience and reflective observation
- Type2.** Preferences for abstract conceptualization and reflective observation
- Type3.** Preferences for abstract conceptualization and active experimentation
- Type4.** Preferences for concrete experience and active experimentation

The Myers-Briggs Type Indicator (MBTI) is a well-known model that classifies learners into four dimensions: extroverts-introverts, sensing-intuition, thinking-feeling and judging-perceiving. Combinations of different dimensions comprise sixteen distinct personalities. The MBTI rationale is that personality traits shape an individual's recognition of the world.

Felder and Silverman's (1988) learning styles model has emerged as a popular model to classify learners in the education field, focusing on preferences in four dimensions: active-reflective (ACT-REF), sensing-intuitive (SEN-SEN), visual-verbal (VIS-VRB) and sequential-global (SEQ-GLO) [10].

Previous research has demonstrated that learning style is a dominant factor in the adoption behavior of online courses or e-learning systems. As in traditional face-to-face classes, students' learning styles shape their experiences in online courses [16]. Akkoyunlu and Soyly (2008) asserted that it is essential that instructors are aware of students' learning styles to guide them in the design and management of web-based learning environments [1]. Lu (2012) also reported that there are differences in students' behaviors and usage in e-learning systems between different learning style clusters [25]. Therefore, there is broad empirical support for a relationship between learning styles and student behavior in e-learning systems.

### 2.3 Perceived Teaching Styles

Teaching style has been emphasized in the domain of education and educational psychology since the 1930s and researchers have continually presented theoretical discussions and categorizations of teaching styles from different perspectives. Lewin, Lippitt and White's (1939) leading styles have been used in a teaching context and researchers classified teaching styles into autocratic, democratic and laissez-faire styles [21]. When the interactions between teachers and students gradually started to be emphasized, Getzels and Thelen (1972) categorized teachers into nomothetic, idiographic and transactional categories [14].

Some researchers used the instructional orientation of teachers as the classification criterion. For example, Ashley, Cohen and Slatter (1969) distinguished teaching styles into teacher-oriented, subject-oriented and learner-oriented styles; the tutoring processes for each style are coercive, utilitarian and normative, respectively [2]. In a similar manner, Fischer and Fischer (1979) specified teachers as being task-oriented, cooperative planners,

child-centered, subject-centered, learning-centered, or emotionally exciting [11].

Chen, Chen, Tseng and Kuo (2007) followed another direction and classified teaching styles by teachers' thinking styles [5]. Beyond these categorizations, researchers have also used metaphors to describe teaching styles. Teachers may act as parents, mentors, pals, adults, motivators, artists and dialogists, among other roles [17] [19].

A research team at Indiana State University (Indiana State University, 2001) proposed a nine-question assessment that helps classify teaching styles into the formal authority, the demonstrator or personal model, the facilitator, or the delegator. Moreover, Grasha (1994) not only proposed five teaching styles (expert, formal authority, personal model, facilitator and delegator) but also designed, with Riechmann-Hruska, a 40-item questionnaire that is used to calculate the degree of each style for a teacher [17].

Based on decades of academic studies and discussions, there have been rich and outstanding studies on the issue of how teaching styles affect students' learning. However, Razak, Ahmad and Shah (2007) argued that perceived and preferred teaching styles are the most effective factors for student learning [32]. Lin, Lu and Lo (2012) suggested that the teaching style that every student perceives is different and that this factor will influence the student's adoption and usage of e-learning systems [22]. Thus, this study uses the student-perceived teaching style instead of the teacher-perceived teaching style.

### 2.4 Learning-Teaching Style Fit

A sizable body of empirical research suggests that students learn best when they are taught in ways that match their styles of learning. These studies suggest that a mismatch between teaching and learning styles could have a negative effect on the students' attitude and, thus, their learning process [24][29][31][33]. For example, if a student is visually oriented, that student will experience difficulties in attaining the pedagogical goals of a delegator teaching style in the requested time. A personal teaching style may not offer an intuitive learner enough opportunities to explore and discover [31]. In other words, traditional teaching materials and strategies generally tend to benefit some students more than others [13].

Styles of teaching and learning may contradict one another. Experts and delegators, for example, may present too many details for the global or

visual learner. In prior papers, students with different learning styles clearly preferred activities that matched their learning styles and the match influenced their learning performance. Students identified activities that matched their primary learning style as typical. These findings further motivated this study to focus on the correspondence between teaching style and learning style. The degree of correspondence highly impacts learning performance, which, unlike teaching style or learning style, is regarded as a relatively objective variable with regard to behavioral usage of e-learning systems.

Additionally, this study adopts the student-perceived teaching style instead of the teacher-perceived teaching style [26]. It is the belief of this study that we can analyze a student's learning style and perceived teaching style to find the learning-teaching fit factor for every student and use this factor to be the mediator in the behavioral intention model.

### 3. PROPOSED THEORETICAL MODEL

The behavioral intention theories based on belief-attitude-intention-behavior causality act as explanatory models for understanding adoption and usage behavior toward different technologies. Prior research considered individual difference and its influences on previously established constructs, such as gender, age, experience, personality and computer skills in the scenario of end-user computing [35]. Venkatesh et al. (2003) developed UTAUT through a review and consolidation of the constructs of several models, including TRA, TAM, MM, TPB, combined TPB/TAM, MPCU, IDT and SCT [36]. To improve the explanatory power of UTAUT, several studies proposed extending it by adding necessary constructs based on the research

focus of each study. Frequently used constructs include demographic and situational variables, cognitive variables and personality-related variables [34][37].

Beyond the demographic individual differences, Blaylock and Rees (1984) extensively examined the effects of cognitive style [3]. Some researchers have investigated individual difference by observing people's cognitive styles and their reflections on system characteristics instead of individual demographic characteristics. Lu et al. (2001) utilized decision styles as the indicator of individual difference in a survey of DSS adoption. Lu and Lin (2012) proposed a modified behavioral intention model that regards learning and teaching styles as cognitive individual differences that affect the adoption of e-learning systems [26].

Many prior studies provided evidence of strong links between teaching styles, learning styles and student performance. These studies show that mismatches of learning and teaching styles often occur and have negative effects on students' learning and attitudes toward learning [23]. Conversely, matches between teaching and learning styles improve learning, attitudes, behavior and motivation. Franzoni and Assar (2007) explored some basic ideas concerning the matching of teaching and learning styles in the context of an experimental e-learning system [12].

In this paper, the Education Behavioral Intention Model (EduBIM) is proposed as a new technology acceptance model. EduBIM integrates into UTAUT cognitive individual differences, learning and teaching styles and their degree of correspondence. Instead of demographic factors, EduBIM focuses on cognitive factors and the fit between learning and teaching styles to improve the comprehensiveness of the model (Figure 3).

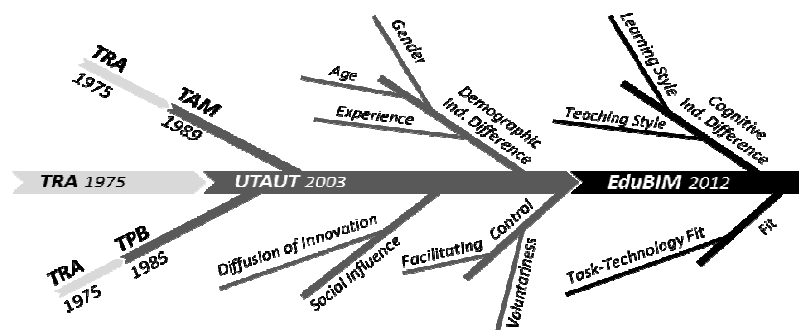


Figure 3 Timeline of Behavioral Intention Theories

Based on UTAUT concepts, EduBIM still regards Performance Expectancy (PE), Effort Expectancy (EE) and Social Influence (SI) as significant factors

that affect users' intention and behavior (see Figure 4). Facilitating Conditions (FC) represent the degree to which a user perceives organizational

support for the use of technology. EduBIM groups FC and Voluntariness of Use into a “Control” category, which indicates the contextual control factors.

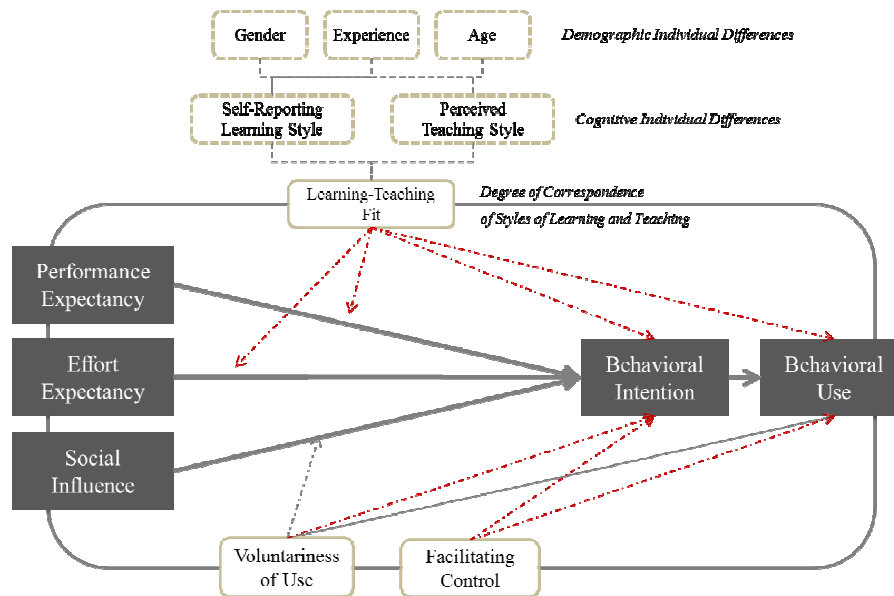


Figure 4 Education Behavioral Intention Model

In UTAUT, the four moderators, gender, age, experience with similar systems and voluntariness of use significantly influence the dependent and independent variables of user acceptance. EduBIM repositions gender, age and experience with similar systems as indirect factors, which means that they affect the cognitive factors, learning and perceived teaching style. In prior papers, learning and teaching styles were the examined cognitive individual differences in a learning context.

EduBIM integrates the core concept of Task-Technology Fit (TTF) to improve the comprehensiveness of the acceptance model. Goodhue (1986) argued that individual satisfactoriness focuses on individual concerns, but IS satisfactoriness focuses on task requirements. Performance is affected by the fit between constructs. This study focuses on the correspondence between teaching style and learning style. The degree of correspondence highly affects learning performance, which, unlike teaching style or learning style, is regarded as a relatively objectively variable with regard to the behavioral usage of e-learning systems.

#### 4. RESEARCH METHODOLOGY

This study enriches the widely used UTAUT model by considering the stylistic qualities of

learners and teachers and presents a new theoretical framework to examine the teachers' and learners' acceptance of e-learning technologies.

To ensure research quality and efficiency, the research design focuses on systematic and integrated processes (Figure 5).

##### ● Literature Review

The literature review will be conducted in the initial step of this research to explore existing studies and construct the theoretical foundation.

##### ● Theoretical Modeling

After thoughtful and dialectical analysis, an integrated theoretical model will be proposed to highlight the key concepts and implications. All the hypotheses and propositions will be verified and tested by a series of rigorous statistical methods.

##### ● Questionnaire Development

In this study, widely accepted and recognized survey questionnaires will be reviewed and integrated for our survey, including the Index of Learning Styles [10], modified Teaching Styles (based on Grasha-Riechmann, 2010) and perception constructs from prior research [18].

##### ● Expert Review and Pilot Test

To assure and improve the quality and feasibility of these questionnaires, expert review and pilot testing will be conducted before the surveys. An



expert focus group will be used to verify and review our integrated survey items for their appropriateness and effectiveness. Furthermore, a pilot test of the questions will be administered and a factor analysis will also identify the underlying variables for perception constructs. To verify the potential confounding effects of the sample's demographics and research variables, Cronbach's  $\alpha$  reliability coefficient will be assessed for internal consistency (reliability analysis) of perceived ease of use, usefulness, preference and willingness.

#### ● Statistical Analysis

This study will conduct cluster analysis to assign learning style and teaching style observations into different groups according to similar and distinguishable characteristics between groups.

The results of the ILS survey described the preference profile of a group of students in terms of active-reflective, sensing-intuitive, visual-verbal and sequential-global dimensions. Similarly, the results of the Grasha-Riechmann teaching styles' survey indicated the preference profile of a group of instructors using five dimensions, including expert, formal authority, personal model, facilitator and delegator.

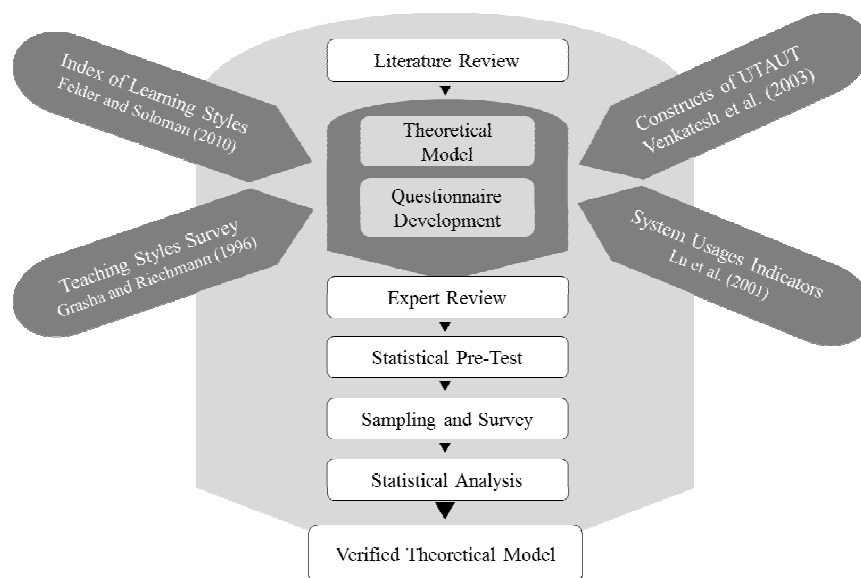


Figure 5 Research Design and Framework

## 5. CONCLUSION AND FUTURE RESEARCH

In the past decade, a number of studies have successfully explored cognitive individual differences in the intention and usage of e-learning systems. Most of them regard learning and teaching styles as cognitive individual differences in the learning context [9][26][27][30]. Prior research has presented students' perceived learning styles and teachers' perceived teaching styles as evaluated by self-reported surveys. Our study argues that the student's perceived teaching style is more important than the teacher's self-reported one [32]. The proposed model, EduBIM, focuses on the degree of correspondence between students' perceived learning and teaching styles, which together directly moderate the intention and usage of e-learning systems. This study enriches the UTAUT model by

integrating cognitive individual differences to synthesize the effects of demographic moderators. This model will enable researchers to evaluate the behavioral intention toward e-learning systems and to propose further studies on system acceptance.

#### REFERENCES:

- [1] Akkoyunlu, B., & Soylu, M.Y. (2008). A study of students' perceptions in a blended learning environment based on different learning styles. *Educational Technology & Society*, 11(1), 183-193.
- [2] Ashley, B. J., Cohen, H. S., & Slatter, R. G. (1969). *An Introduction to the Sociology of Education*. London: Macmillan.



- [3] Blaylock, B.K., and L.P. Rees (1984). Cognitive Style and The Usefulness of Information. *Decision Sciences*, 15, 74–91.
- [4] Bostrom, R. P., Olfman, L. and Sein M. K. (1990). The Importance of Learning Style in End-User Training. *MIS Quarterly*, 101-119.
- [5] Chen, Y.-F., Chen, H.-Z., Tseng, S.-C., & Kuo, B.-C. (2007). Measurements of teaching styles for computer teachers. Paper presented at the 2007 National computer symposium, Taipei.
- [6] David Gefen, and Detmar, W. Straub (1997). Gender Differences in the Perception and Use of E-Mail: An Extension to the Technology Acceptance Model. *MIS Quarterly*, 21(4), 384-400.
- [7] Davis, F. D. (1989a). Perceived usefulness, perceived ease of use and end-user acceptance of information technology. *MIS Quarterly*, 13, 318-339.
- [8] Davis, F. D. (1989b). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- [9] Farida U-K, and Sridhar I (2009). ELAM: A Model for Acceptance and Use of E-learning by Teachers and Students. International Conference on e-learning (ICEL), Toronto, Canada.
- [10] Felder, R. M. and Silverman, L. K. (1988). Learning and Teaching Styles in engineering Education. *Journal of Engineering Education*, ASCE, 78(7), 674-681.
- [11] Fischer, B. B. and Fischer, L. (1979). Styles in Teaching and Learning. *Educational Leadership*, 36,245-254.
- [12] Franzoni, A., & Assar, S. (2007). Using Learning Styles to enhance an e-Learning System. Proceedings of the 6th European Conference on e-Learning, Copenhagen, Denmark: Academic conference management, 235-244.
- [13] Franzoni, A. L., and Assar, S. (2009). Student Learning Styles Adaptation Method Based on Teaching Strategies and Electronic Media. *Educational Technology & Society*, 12 (4), 15–29.
- [14] Getzels, J. W., & Thelen, H. A. (1972). A conceptual framework for the study of the classroom group as a social system. In A. Morrison & D. McIntyre (Eds.), *The Social Psychology of teaching*. New York: Penguin Books Ltd.
- [15] Goodhue, D. (1986) IS Attitudes: Towards Theoretical Definition and Measurement Clarity. Proceedings of the Seventh International Conference on Information Systems, San Diego, 181-194.
- [16] Graf, S., Liu, T.C., & Kinshuk (2010). Analysis of learners' navigational behaviour and their learning styles in an online course. *Journal of Computer Assisted Learning*, 26(2), 116-131.
- [17] Grasha, A. F. (1994). A matter of style: The Teacher as Expert, Formal Authority, Personal Model, Facilitator, and Delegator. *College Teaching*, 42(4), 142-149.
- [18] Grasha, A. F. (2010). A Grasha-Riechmann Teaching Style Survey. Retrieved Dec. 1, 2010, from <http://www.longleaf.net/teachingstyle.html>
- [19] Kraft, A. (1975). *The Living Classroom. Putting Humanistic Education into Practice*. New York: Harper & Row.
- [20] Kolb, D. A. (1984). *Experiential Learning: Experience as the source of learning and development*. Upper Saddle River, New Jersey: Prentice Hall.
- [21] Lewin, K., Lippitt, R., & White, R. K. (1939). Patterns of aggressive behavior in experimentally created social climates. *Journal of Social Psychology*, 10, 271-301.
- [22] Lin, P.C., Lu, H. K., Lo, C. H. (2012). Exploring the impact of perceived teaching style on behavioral intention toward E-learning systems. Proceedings of the Seventh International Conference on Information Systems, Thailand.
- [23] Littlewood, W., Liu, N-F. & Yu, C. (1996). Hong Kong tertiary students' attitudes and proficiency in spoken English. *RELJ Journal*, 27(1), 70-88.
- [24] Lovelace, M. K. (2005). Meta-analysis of experimental research based on the Dunn and Dunn model. *The Journal of Education Research*, 98(3), 176-183.
- [25] Lu, H.K. (2012). Learning Styles and Acceptance of e-Learning Management Systems: An Extension of Behaviour Intention Model. *International Journal of Mobile Learning and Organisation*. Proceeding.
- [26] Lu, H.K., & Lin, P.C. (2012). Toward an extended behavioral intention model for e-learning: Using learning and teaching styles as individual differences. 2012 Consumer Electronics, Communications and Networks (CECNet) International Conference, 3673 – 3676.



- [27] Marie-Christine Opdenakker, J. V. D. (2006). Teacher characteristics and teaching styles as effectiveness enhancing factors of classroom practice. *Teaching and Teacher Education*, 22(1), 1-21.
- [28] Moran, M., Hawkes, M., & El Gayar, O. (2010). Tablet personal computer integration in higher education: Applying the unified theory of acceptance and use technology model to understand supporting factors. *Journal of Educational Computing Research*, 42(1), 79-101.
- [29] Ogden, W. R. (2003). Reaching all the students: The feedback lecture. *Journal of Instructional Psychology*, 30(1), 22-27.
- [30] Onur, J. (2008). A study of the effects on teaching methods and teaching styles of converging national and international curricula at the Koc School.
- [31] Provitera, M. J., & Esendal, E. (2008). Learning and teaching styles in management education: Identifying, analyzing, and facilitating. *Journal of College Teaching and Learning*, 5(1), 69-78.
- [32] Razak, N.A., Ahmad, F., & Shah, P.M. (2007). Perceived and preferred teaching styles ( methods ) of english for specific purposes (ESP) Students. *Jurnal e-Bangi*, 2(2), 1-20.
- [33] Sabehe, G., Bahous, R., Bacha, N.N. and Nabhani, M(2011). A Match or a Mismatch between Student and Teacher Learning Style Preference, *International Journal of English Linguistics*, 1(1), 162-172
- [34] sykes., T. A., Venkatesh, V., and Gosain, S. (2009). Model of Acceptance with Peep Support: A Social Network Perspective to inderstand employee' System Use. *MIS Quarterly*, 33(2), 371-393.
- [35] Van Raaij, E. M., and Schepers, J. J. L. (2008). The acceptance and use of a virtual learning environment in China. *Computers & Education*, 50(3), 838-852.
- [36] Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D. (2003) "User Acceptance of Information Technology: Toward a Unified View", *MIS Quarterly*, 27(3), 425-478.
- [37] Wang, Y.-S., Wu, M.-C., & Wang, H.-Y. (2009). Investigating the determinants and age and gender differences in the acceptance of mobile learning. *British Journal of Educational Technology*, 40(1), 92-118.