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Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors

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ABSTRACT

To identify the most commonly used external factors of Technology Acceptance Model (TAM) in the context of e-learning adoption, a quantitative meta-analysis of 107 papers covering the last ten years was performed. The results show that Self-Efficacy, Subjective Norm, Enjoyment, Computer Anxiety and Experience are the most commonly used external factors of TAM. The effects of these commonly used external factors on TAM's two main constructs, Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), have been studied across a range of e-learning technology types and e-learning user types. The results show that the best predictor of student's PEOU of e-learning systems is Self-Efficacy ($\beta = 0.352$), followed by Enjoyment ($\beta = 0.341$), Experience ($\beta = 0.221$), Computer Anxiety ($\beta = -0.199$) and Subjective Norm ($\beta = 0.195$). The best predictor of student's PU of e-learning systems is Enjoyment ($\beta = 0.452$), followed by Subjective Norm ($\beta = 0.301$), Self-Efficacy ($\beta = 0.174$) and Experience ($\beta = 0.169$). Using these external factors and their effect sizes on PEOU and PU, this study proposes a General Extended Technology Acceptance Model for E-Learning (GETAMEL).

1. Introduction

E-learning is electronic learning, defined as a tool that uses computer network technology such as internet, intranets and extranets to deliver learning instructions to users (Cheng, 2011; Engelbrecht, 2005; Welsh, Wanberg, Brown, & Simmering, 2003). Similarly, an e-learning system is defined by Lee, Hsieh, and Ma (2011, p.355) as "an information system that can integrate a wide variety of instructional material (via audio, video, and text mediums) conveyed through e-mail, live chat sessions, online discussions, forums, quizzes and assignments". E-learning systems have become an important part of delivering the modern university curriculum (Paechter, Maier, & Macher, 2010, p.222), supporting teaching and learning in higher education through delivering information and instructions to learners via the Internet (Lee, Hsieh, & Chen, 2013, p.173). They also provide new ways of learning, enabling teachers to deliver learning instructions via audio, video, animations, images and text, as well as providing online learning spaces and timely feedback methods (accessible to students anytime and anywhere).

However, the benefits of an e-learning system cannot be maximised if learners do not use it (Alenezi, 2012, p.1; Lai, Wang, & Lei, 2012, p.569; Pituch & Lee, 2006, p.222; Tarhini, Hone, & Liu, 2014, p.153). Therefore, it is important to identify the factors that influence students to use e-learning to make it an effective teaching and learning tool in education (Sharma & Chandel, 2013, p.44). To do this, researchers have used a number of different technology adoption theories, including Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Task Technology Fit (TTF), Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM). Among these theories, "TAM is the most common ground theory in e-learning acceptance literature" (Šumak, Heričko, & Pušnik, 2011, p.2068).

E-learning researchers have been extending TAM with different external factors for more than a decade. This has resulted in a large number of different external factors and a high number of extended technology acceptance models in e-learning adoption studies (Lefievre, 2012; Martin, 2012; Williams & Williams, 2009). Given this, there is a need for a General Extended Technology Acceptance Model for E-Learning (GETAMEL). This model should be generally useful and broadly applicable to various e-learning technologies or systems and be based on a set of the most commonly used external factors. In order to develop such a model, the objectives of this study were therefore to: (1) systematically review recent e-learning

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adoption studies that have extended TAM, (2) identify the most commonly used external factors among these studies, (3) identify the strengths of the relationship between the most commonly used external factors and students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-learning systems and (4) propose a General Extended Technology Acceptance Model for E-Learning (GETAMEL).

This study incorporates 107 studies (87 published journal papers and 20 conference papers) to identify the commonly used external factors of TAM. Once these factors were identified, the studies were categorised into different e-learning technology types (e.g. 'e-learning systems' and 'e-learning technology/tools') and e-learning user types ('employees', 'students' and 'teachers'). Checking for publication bias, via the file drawer problem, was not possible for this meta-analysis as the vast majority of the studies reported only significance levels, with no standard error values. However categories could still be analysed to determine the strength of the relationships between the commonly used external factors and students' PEOU and PU of e-learning systems and through this a General Extended Technology Acceptance Model for E-Learning (GETAMEL) was developed.

2. Background research – technology acceptance model (TAM)

Previous research studies have identified many factors that can affect users' behaviour towards using technologies. In the context of knowledge sharing in the e-learning, Hosseini, Bathaei, and Mohammadzadeh (2014) reported Self-Efficacy to be an important factor in influencing knowledge sharing in e-learning systems. Zhang, de Pablos and Xu (2014) have found that personal culture values (such as Power Distance, Confucian Dynamism and Uncertainty Avoidance) have moderating effects on users' knowledge sharing attitude within a multi-national virtual class.

In regards to adoption of new media in the general environment, Zhou, Fang, Vogel, Jin, and Zhang (2012) found that affective commitment (being attracted to) and calculative commitment (being locked in) affect users' continuance intention to adopt social virtual world services. According to Banerjee and Dey (2013) three factors that influence users to use Facebook – rich in usefulness, web site design to enhance users' convenience and trust worthiness.

E-learning researchers have also reported that, when learners are presented with a new learning system their decision to use the system is affected by different factors, including Computer Self-Efficacy (Chow, Herold, Choo, & Chan, 2012), Social Influence (Farahat, 2012, p.100), Perceived Enjoyment (Wu & Gao, 2011, p.47), Computer Anxiety (Alenezi, Abdul Karim & Veloo, 2010, p.29) and Experience (Martin, 2012, p.501). To identify and analyse these factors, researchers have predominantly used the Technology Acceptance Model (Šumak et al., 2011, p.2068).

TAM, shown in Fig. 1, was adapted from the Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) by Davis in 1986, its purpose is to explain technology adoption behaviour. In TAM, external variables are proposed to trace the impact of outside factors on users' two main perceptions, perceived ease of use (PEOU) and perceived usefulness (PU). PEOU directly influences PU. These perceptions affect users' positive or negative attitudes towards using the technology. Attitude towards using the technology influences behavioural intention to use the technology. PU also directly influences behavioural intention to use. Behavioural intention to use technology then determines actual use.

2.1. Why the technology acceptance model?

TAM has been widely used to underpin e-learning acceptance or use (Al-Gahtani, 2014; Hidayanto, Febriawan, Sucahyo, & Purwandari, 2014; Hsia, Chang, & Tseng, 2014; Lee, Hsiao, & Purnomo, 2014; Motaghian, Hassanzadeh, & Moghadam, 2013; Padilla-Melendez, Aguila-Obra, & Garrido-Moreno, 2013; Tarhini et al., 2014; Wu & Zhang, 2014). A meta-analysis study carried out by King and He (2006) presents some good results when using TAM. King and He's study incorporated 88 research papers and reported high credibility of TAM. The result of their analysis showed "TAM to be a valid and robust model" (p.740). A systematic review of 42 e-learning acceptance studies by Šumak et al. (2011) showed that TAM is the most common theory in existing e-learning acceptance research, with 86% of the studies using TAM as a ground theory (p.2069). Also the results of previous e-learning studies (including Ifinedo, 2006, p.12; Lee et al., 2014, p.572; Lee et al., 2013, p.182; Liu, Li, & Carlsson, 2010, p.1217; Shen & Chuang, 2010, p.205) show that extended TAM models provided good explanatory power, with total variance, explained in their extended TAM models, ranging from 52% to 70%. The convenience of implementing TAM in e-learning acceptance research also has been confirmed by many other researchers (including Emmett, 2011; Escobar-Rodriguez & Monge-Lozano, 2012; Lin, Persada, & Nadlifatin, 2014). TAM is therefore adopted for this study as a ground theory to develop a General Extended Technology Acceptance Model for E-Learning (GETAMEL) which incorporates the most commonly used external factors of TAM.

2.2. Extended technology acceptance model

Perceived Ease of Use and Perceived Usefulness are the most important factors in the technology acceptance model (Chen, Lin, Yeh, & Lou, 2013, p.112). Perceived Ease of Use refers to "the degree to which a person believes that using a particular system would be free of effort". Perceived Usefulness is explained as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989). In the TAM model, both these factors are influenced by external factors

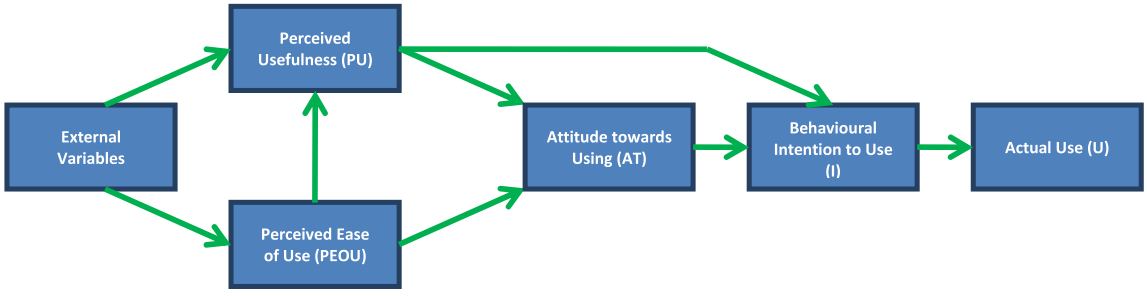

Fig. 1. Technology Acceptance model (Davis, 1986).

(Park, Son, & Kim, 2012, p.382; Chen et al., 2013, p.119; Al-Ammary, Al-Sherooqi, & Al-Sherooqi, 2014, p.212). Therefore, external factors (also known as antecedents of PEOU and PU) play a vital role in explaining technology adoption behaviour (Emmett, 2011; Davis, Bagozzi, & Warshaw, 1989; Liu, Chen, Sun, Wible, & Kuo, 2010, p.601). Venkatesh and Davis (1996, p. 473) argued that "in order to be able to explain user acceptance and use, it is important to understand the antecedents of the key TAM constructs, perceived ease of use and usefulness".

Furthermore, Mathieson (1991) argues that TAM without external factors, provides only broad information on user's opinions about a system but does not offer "specific information that can better guide system development" (p.173). TAM with specified external factors not only predicts technology usage but also provides explanation of why a particular system may not be adopted, so that researchers and practitioners "pursue appropriate corrective steps" (Davis et al., 1989, p.985).

Because of this, many researchers have extended TAM with different external factors to underpin e-learning acceptance or use (including: Cheung & Vogel, 2013; Hidayanto et al., 2014; Lee & Lehto, 2013).

This study has found 107 recent studies that have explained the likelihood of e-learning acceptance or use by extending TAM with a range of external factors. These 107 studies have studied a total of 152 different external factors. A commonality of factors helped to resolve the study's first research question:

What are the most commonly used external factors of TAM that have been proven to affect learner's decision to adopt e-learning systems or technologies, in at least 10 e-learning adoption studies?

Once the most commonly used external factors had been identified, it was necessary to measure and highlight the strengths of the relationship between the external factors and PEOU and/or PU, to be able to propose a General Extended Technology Acceptance Model for E-Learning.

Researchers who extend TAM are mostly interested in relationships between external factors and TAM's two main constructs (PEOU and PU). Based on existing literature, they first, hypothesise relationships between the factors. Secondly they test these hypothesises by gathering data (mostly using surveys), and statistically analysing the data (mostly using Structural Equation Modelling). They then present the results of their study in a set of causal relationships. The strength of each causal relationship is measured using path coefficients (effect size) and p-value (significance level). The path coefficient indicates the causal effects of the independent variables (external factors) on the dependent variables (PEOU and/or PU) (Lleras, 2005, p.27). The p-value indicates whether the relationship is significant. In e-learning adoption studies, there are variation in both the path coefficient and the p-value (Šumak et al., 2011, p.2068). This leads to the second research question:

What is the average path coefficient (effect size) of the most commonly used external factors on students' PEOU and/or PU of e-learning systems?

3. Research methodology

To answer the above research questions a quantitative meta-analysis was used. The study reviewed the existing literature in order to find recent e-learning studies that have extended TAM. These studies were sought using a combination of keywords either related to TAM theory (Technology Acceptance Model, Perceived Ease of Use, Perceived Usefulness and External Factor) or e-learning systems (e-learning, eLearning, web-based learning, on-line learning, etc.). Using a range of journal databases (ScienceDirect, Taylor & Francis Online, IEEExplore, etc) and search engines (Google Scholar, Summon) 107 valid studies were identified (shown in Table 1).

To ensure the consistency of papers for data analysis, the following criteria were used when selecting valid papers.

- The papers had to be from within the last 10 years (similar to previous studies such as: Imtiaz and Mirhashemi (2013, p.23) and Yucel and Gulbahar (2013, p.100)).
- The papers had to have extended and used TAM in an empirical study (similar to previous studies such as: Legris, Ingham, and Collerette (2003, p.193) and Schepers and Wetzels (2007, p.92)).
- The papers had to have investigated acceptance or usage of e-learning technologies or systems
- The study methodology had to be well described (similar to previous studies such as: Legris et al. (2003, p.193) and Schepers and Wetzels (2007, p.92)).
- The study results had to be presented and complete (similar to previous studies such as: Legris et al.(2003, p.193)).

After identifying valid papers all the constructs in the studies were grouped in order to identify the most commonly used external factors. To have confidence in the strength of the relationship between the external factors and TAM, the authors selected and analysed external factors where their relationship with TAM had been tested and confirmed in 10 or more of the studies. The number 10 was chosen as it provided a clear cut off point, with consistent questionnaire items for the 5 identified external factors only confirmed in 10 or more studies. Other factors, such as Facilitating Conditions for example, were confirmed in fewer studies and we could not find consistent questionnaire items for them among the studies.

A total of 152 external factors were identified and tested within the 107 studies, however only five external factors (Self-Efficacy, Subjective Norm, Enjoyment, Computer Anxiety and Prior Experience) were confirmed to have a relationship with TAM in 10 or more of the studies (shown in Table 2).

Once common externals factors had been identified, the studies were grouped based on e-learning technology types and e-learning user types. The e-learning technology types were categorised into 'e-learning systems' and 'e-learning technology/tools'. The e-learning user types were categorised into 'employees', 'students', and 'teachers'. These categories were analysed and used to determine the average effect size of the commonly used external factors on students' PEOU and PU of e-learning systems.

The strengths of the relationships between the factors were recorded in terms of the following information:

- Independent variable – the name of the commonly used external factor
- Dependent variable – the TAM's two main constructs (PEOU or PU)
- Effect size –the Path coefficient (β)
- Significance level – the p-value or t-value
- Whether the relationship is positive or negative

Based on the average effect size of the commonly used external factors on students' PEOU and PU of e-learning systems, the study then proposed a General Extended Technology Acceptance Model for E-Learning (GETAMEL).

The Computers & Education Journal publishes the majority of the e-learning acceptance papers (shown in Table 3).

4. Data/correlation analysis

In order to identify the strengths of the relationships between the five external factors, PEOU and PU correlation coefficient

Table 1
Showing 107 recent studies that have extended TAM to explain e-learning adoption. These studies were used to conduct the meta-analysis.

Study	E-learning technology type	User type	TAM constructs					External factors									
			PEOU	PU	AT	I	U										
Abbad, Morris and de Nahlik (2009)	E-learning system	486Students	✓	✓		✓		Subjective Norm	Internet Experience	System Interactivity	Self-Efficacy	Technical Support					
Abdel-Wahab (2008)	E-learning system	258 Students	✓	✓	✓	✓		Resources	Pressure to Use								
Agudo-Peregrina, Hernández-García and Pascual-Miguel (2013)	E-learning system	81Students	✓	✓		✓	✓	Relevance for learning	perceived Intention	Subjective norm	Self -Efficacy	Computer Anxiety	Personal Innovativeness	Perceived Playfulness	Facilitating Conditions	Self-reported Habit	
Al-alak and Alnawas (2011)	E-learning system	832 Lecturers	✓	✓		✓		Management Support	Computer knowledge	Computer anxiety	Experience	Normative Pressure					
Al-Ammari and Hamad (2008)	E-learning system	155Students	✓	✓		✓		Content Quality	Computer Self-Efficacy	Subjective Norm	Individualism vs. Collectivism	Power Distance	Uncertainty Avoidance	Masculinity vs. Femininity	Long term orientation		
Al-Ammary, Al-Sherooqi and Al-Sherooqi (2014)	E-learning technology/tools (Social Networking)	109Students	✓	✓		✓		Computer Self-Efficacy	System design and features	Perceived enjoyment	Perceived mobility value	Perceived interactivity	Social Influence				
Al-Aulamie, Mansour, Daly and Adjei (2012)	E-learning system	51Students	✓	✓		✓		Enjoyment	Computer Playfulness								
Alenezi (2012)	E-learning system	408Students	✓	✓	✓	✓	✓	System Performance	System Functionality	System Response	System Interactivity						
Alenezi, Abdul Karim and Veloo (2010)	E-learning system	408Students	✓	✓	✓	✓		Enjoyment	Computer Anxiety	Computer Self-Efficacy	Internet experience						
Alenezi, Karim and Veloo (2011)	E-learning system	408 Students	✓	✓		✓	✓	Facilitating Conditions	Training	Institutional Technical Support							
Al-Gahtani (2014)	E-learning system	286 Students	✓	✓		✓	✓	Subjective Norm	Image	Job Relevance	Result Demonstrability	Computer Self-Efficacy	Perception of External Control	Computer Anxiety	Computer Playfulness	Perceived Enjoyment	Objective Usability
Ali, Ahmed, Tariq and Safdar (2013)	E-learning system (Second Life (SL))	425Students	✓	✓		✓		Computer Playfulness	Computer Self-Efficiency	Computer Anxiety							
Al-Mushasha (2013)	E-learning system	224Students	✓	✓	✓	✓		University Support	Computer Self-Efficacy								
Arenas-Gaitan, Rondan-Cataluna and Ramirez-Correa (2010)	E-learning system (E-Learning Platform)	189 Students	✓	✓		✓	✓	Result demonstratability	Perception of External Control	Perceived Enjoy							
Aypay, Çelik, Aypay and Sever (2012)	E-learning technology/tools (computer)	754Students	✓	✓	✓	✓		Self- Efficacy	Technological Complexity	Facilitating Conditions							
Bhatiasevi (2011)	E-learning system	207Students	✓	✓		✓		Computer Self-Efficacy	System functionality	Teaching materials							
Brown, Stothers, Thorp and Ingram (2006)	E-learning technology/tools (web-based quiz tool)	171 Students	✓	✓		✓	✓	Compatibility	Self-Efficacy	Perceived Enjoyment							
Calisir, AltinGumussoy,Bayraktaroglu and Karaali(2014)	E-learning system (Web based learning system)	546Blue-collar workers	✓	✓	✓	✓		Image	Perceived content quality	Perceived system quality	Anxiety						
Chang, Yan and Tseng (2012)	E-learning technology/tools (Mobile)	158Students	✓	✓	✓	✓		Perceived convenience									
Chen and Tseng (2012)	E-learning system (Web-based learning system)	402 Teachers	✓	✓		✓		Motivation to use	Computer Anxiety	Internet Self-Efficacy							
Chen, Chen, Lin and Yeh (2007)	E-Learning Systems (web-based learning platform)	214 Students	✓	✓		✓	✓	Perceived Enjoyment	System Features	Characteristics of Teaching Materials	Self-Efficacy						
Chen, Lin, Yeh and Lou (2013)	E-learning system (web-based instruction system)	218 Students	✓	✓		✓		Perceived Enjoyment	System Characteristics	Anxiety	Social Influence	Self-Efficacy					
Cheng (2011)	E-learning system	328Employees	✓	✓	✓	✓	✓	Computer Self-Efficacy& Internet Self-Efficacy	Cognitive absorption	Learning goal orientation	System functionality	System interactivity	System response	Content quality	Interpersonal influence & External influence	Network externality	Perceived Enjoyment	Perceived Performance
Cheng (2012)	E-learning system	483Employees	✓	✓		✓		Course content quality	Course design quality	Support service quality	System functionality	System interactivity	System response	User-interface design	Instructor attitude towards e-learners	Perceived Enjoyment		
Cheng (2013)	E-learning system	218 Nurses	✓	✓		✓		Learner-System Interaction	Instructor-Learner Interaction	Learner-Learner Interaction	Flow						
Cheung and Vogel (2013)	E-learning technology/tools	136 Students	✓	✓	✓	✓	✓	Sharing	Perceived Resource	Compatibility	Subj Norm - Peer	Subj Norm - Media	Subj Norm - Lecturer	Self-Efficacy			
Cho, Cheng and Lai (2009)	E-learning technology/tool	445 Students	✓	✓		✓		Perceived Functionality	Perceived User-Interface Design	Perceived System Support	User Satisfaction						
Chow, Herold, Choo and Chan (2012)	E-learning System	206 Students	✓	✓		✓		Computer Self-Efficacy									
De Smet, Bourgonjon, De Wever, Schellens and Valcke (2012)	E-learning system (learning management systems)	505 Teachers	✓	✓			✓	Personal Innovativeness towards IT	Experience	Subjective norm	Internal ICT support	Communicational use					
Deshpande, Bhattacharya and Yammiyavar (2012)	E-learning system	40Students	✓	✓	✓	✓	✓	Computer Friendliness	Facilitating Conditions								
Escobar-Rodriguez and Monge-Lozano (2012)	E-learning system (Moodle)	162 Students	✓	✓		✓		Perceived usefulness for professors	Perceived compatibility with student tasks	Training							
Fadare, Babatunde, Akomolafe and Lawal (2011)	E-learning technology/tools (mobile)	458 Students	✓	✓	✓	✓		Self -Efficacy	Subjective norm	System Accessibility							
Farahat (2012)	E-learning system (online learning)	121 Students	✓	✓	✓	✓		Social influence									
Hashim (2008)	E-learning technology/tool (Web-based training)	261Employees	✓	✓	✓			perceived comfortableness									
Hei and Hu (2011)	E-learning technology/tools (m-learning)	253 Students	✓	✓	✓	✓		Social Influence	Perceived Ubiquity								
Hidayanto, Febriawan, Sucahyo and	E-learning system (E-Class)	74users of e-Class system	✓	✓	✓	✓	✓	Task Technology Fit									

Purwandari(2014)																		
Hsia and Tseng (2008)	E-learning system	233Employees	✓	✓		✓		Computer Self-Efficacy	Perceived Flexibility									
Hsia, Chang and Tseng(2014)	E-learning system	223Employees	✓	✓		✓		Locus of control	Computer Self-Efficacy									
Hsu and Chang (2013)	E-learning system (Moodle)	82Students	✓	✓	✓	✓		Perceived convenience										
Hussein, Aditiawarman and Mohamed (2007)	E-learning System	147 Students	✓	✓		✓		Computer Self Efficacy	Convenience	Instructional Design	Technological Factors	Instructior's Characteristic						
Ifinedo (2006)	E-learning system (WebCT)	72Students	✓	✓		✓	✓	Ease of Finding	Ease of Understanding	Self-Efficacy	Computer anxiety							
Jan and Contreras (2011)	E-learning technology/tools (Academic and Administrative Information System)	89Students	✓	✓	✓	✓	✓	Subjective Norm	Compatibility									
Karaali, Gumussoy and Calisir (2011)	E-learning system (web-based learning system)	546Blue-collar workers	✓	✓	✓	✓		Facilitating conditions	Anxiety	Social Influence								
Lau and Woods (2008)	E-learning technology/tools (multimedia learning object technology)	342 Students	✓	✓		✓	✓	Technical Quality	Content Quality	Pedagogical Quality	Self -Efficacy	Internet Experience						
Lee (2006)	E-learning system	1,085Students	✓	✓		✓	✓*	Content Quality	Perceived Network Externality	Computer Self-Efficacy	Course Attributes	Subjective Norm	Competing Behavioral Intention					
Lee (2008)	E-learning system (online learning system)	1,107Students	✓	✓		✓		Internal computing support	Internal computing training	Internal equipment accessibility	External computing support	External computing training	External equipment accessibility					
Lee and Lehto (2013)	E-learning technology/tools (YouTube for procedural learning)	432 YouTube users	✓	✓		✓		Task technology fit	Content richness	Vividness	YouTube Self-Efficacy	User satisfaction						
Lee, Cheung and Chen (2005)	E-learning technology/tools (Internet-based learning medium)	544 Students	✓	✓	✓	✓		Perceived Enjoyment										
Lee, Hsiao and Purnomo(2014)	E-learning system	326 Students	✓	✓		✓		Computer Self-Efficacy	Internet Self-Efficacy	Instructor's attitude toward students	Learning content	Technology accessibility						
Lee, Hsieh and Chen (2013)	E-learning system	332Employees	✓	✓	✓	✓		Task equivocality	Prior experiences	Computer self-efficacy	Organisational support							
Lee, Hsieh and Ma (2011)	E-learning system	357Employees	✓	✓		✓		Organizational support	Management support	Task equivocality	Task interdependence	Computer self-efficacy	Individuals' experience with computers	Subjective norm				
Lee, Lee and Yoon (2009)	E-learning system	214 Students	✓	✓		✓		Instructor Characteristics	Teaching Materials	Design of Learning Contents	Playfulness							
Lefievre (2012)	E-learning system (MediaPlus)	291 Students	✓	✓		✓	✓	Relevance	Result demonstrability	Perceived enjoyment	Computer anxiety	Computer playfulness						
Lin, Chen and Yeh(2010)	E-learning system (multimedia e-learning system)	214 Students	✓	✓		✓		Perceived Enjoyment	System Characteristics	Courseware Features	Self-Efficacy							
Lin,Persada and Nadlifatin(2014)	E-learning system (Blackboard Learning System)	302 Students	✓	✓	✓	✓		Perceived Interactivity										
Liu (2010)	E-learning system (Wikis)	126 Students	✓	✓		✓	✓	Perceived behavioral control	Wiki Self-Efficacy	Online posting anxiety								
Liu, Li and Carlsson (2010)	E-learning technology/tools (m-learning)	220 Students	✓	✓		✓		Personal Innovativeness										
Liu, Liao and Pratt (2009)	E-learning system	88Students	✓	✓	✓	✓		E-learning Presentation Types	Concentration									
Ma, Chao and Cheng (2013)	E-learning system	650Nurses	✓	✓		✓		Task Characteristics	Technology Characteristics	Task Technology Fit	Computer Self-Efficacy	User Satisfaction						
Macharia and Nyakwende (2009)	E-learning technology/tools (Internet use in learning)	200 Students	✓	✓		✓	✓	Competition Pressure	Government Support	ICT Vendors Support	Perceived Socio Economic							
Martin (2012)	E-learning technology/tools (Social Networking in e-Learning)	210 Students and Educators	✓	✓		✓	✓	Subjective Norm (SN)	Extrinsic Motivation (EM)	Intrinsic Motivation (IM)	Technology Experience	System Interactivity	Information Privacy (IP)					
Martinez-Torres, Marin, Garcia, Vazquez, Oliva and Torres (2008)	E-learning technology/tools	220 Students	✓	✓		✓	✓	Communicativeness	Format	User adaptation	Feedback	Methodology	Interactivity and Control	Accessibility	Reliability	User tools	Diffusion	Enjoyment
Moghadam and Bairamzadeh (2009)	E-learning system	155 Students	✓	✓		✓		personal innovativeness in domain of information technology	Computer Self-Efficacy	Subjective Norm								
Mohamed and Abdul Karim (2012)	E-learning technology/tools (Claroline- an Open Source E-learning)	160 Students	✓	✓		✓		Computer application anxiety	Self-Efficacy									
Motaghian, Hassanzadeh and Moghadam (2013)	E-learning system (Web-based learning system)	115 University Instructors	✓	✓		✓	✓	Information quality	system quality	service quality	Subjective Norm	Self-Efficacy						
Ngai, Poon and Chan (2007)	E-Learning system (Web Course Tools- WebCT).	1,263Students	✓	✓	✓	✓	✓	Technical Support										
Okazaki and Renda dos Santos (2012)	E-learning system	446 University Faculty members	✓	✓	✓	✓	✓*	Social interaction										
Padilla-Melendez, Aguila-Obra and Garrido-Moreno (2013)	E-learning system (Moodle)	484 Students	✓	✓	✓	✓		Perceived Playfulness										
Padilla-Meléndez, Garrido-Moreno and Aguila-Obra (2008)	E-learning Technology/tool. (E-collaboration)	225 Students	✓	✓	✓	✓		Computer Self-Efficacy										
Park (2009)	E-learning system	628 Students	✓	✓	✓		✓	E-learning Self-Efficacy	Subjective norm	System accessibility								
Park, Nam and Cha	E-learning	288	✓	✓	✓	✓		Mobile Learning	Major	System	Subjective							

(2012)	technology/tools (m-learning)	Students						Self-Efficacy	Relevance	Accessibility	Norm						
Park, Son and Kim (2012)	E-learning system (Web-based training systems)	408Construction Professionals	✓	✓				Enjoyment	Computer Anxiety	Social Influence	Organisation Support	Information Quality	System Quality	User Satisfaction	Transfer of Training		
Pituch and Lee (2006)	E-learning system	259 Students	✓	✓			✓	System functionality	System interactivity	System response	Self -Efficacy	Internet experience					
Poelmans, Wessa, Milis, Bloemen and Doom (2008)	E-learning system	200 Students	✓	✓		✓		Information Quality	system quality								
Premchaiswadi, Porouhan and Premchaiswadi (2012)	E-learning system	86 Students	✓	✓		✓		Internet Experience	Subjective Norm	Self-Efficacy	System Interactivity	Technical Support					
Purnomo and Lee (2013)	E-learning system	306Employees	✓	✓		✓		Management Support	Computer Self-Efficacy	Prior Experience	Computer Anxiety	Compatibility					
Rejón-Guardia, Sánchez-Fernández and Muñoz-Leiva (2013)	E-learning technology/tools (microblogging)	135 Students	✓	✓		✓		Subjective Norm	Image								
Rezaei, Mohammadi, Asadi and Kalantary (2008)	E-learning system	120 Students	✓	✓		✓		Affect	Computer Self-Efficacy	Age	Computer Anxiety	Internet Experience					
Roca and Gagné (2008)	E-learning system	166Workers	✓	✓		✓		Perceived Autonomy Support	Perceived Competence	Perceived Relatedness	Perceived Playfulness						
Saadé and Kira (2006)	E-learning system (Online systems for learning)	114 Students	✓	✓	✓			Affect	Anxiety								
Sánchez and Hueros (2010)	E-learning system (Moodle)	226 Students	✓	✓	✓		✓	Technical Support									
Sanchez-Franco (2010)	E-learning system (WebCat)	431 Students	✓	✓		✓		Perceived affective quality	Flow								
Seif, Rastegar, Ardakani and Saeedikiya (2013)	E-learning system (Web-based learning system)	120 Students	✓	✓		✓		Pleasure Seeking	Applicability								
Shah, Bhatti, Iftikhar, Qureshi and Zaman (2013)	E-learning system	400 Students	✓	✓		✓		Information Quality	Service Quality	System Quality							
Shah, Iqbal, Janjua and Amjad (2013)	E-learning system (E-learning course)	172 Employees	✓	✓		✓		Gender	Age	Scale	Learning Objective						
Shen and Chuang (2010)	E-learning system	350 Students	✓	✓	✓	✓		Interactivity	Perceived Self-Efficacy								
Shen and Eder (2009)	E-learning system (virtual world Second Life)	77Students	✓	✓		✓		Computer Playfulness	Computer Self-Efficacy	Computer Anxiety							
Shyu and Huang (2011)	E-learning system (e-government learning) to facilitate learning	307 Students	✓	✓	✓	✓	✓	Perceived e-government learning value	Perceived enjoyment								
Tajudeen, Basha, Michael and Mukthar (2012)	E-learning technology/tools (m-learning)	272 Students	✓	✓	✓	✓	✓**	Perceived Enjoyment	Facilitating Condition								
Tarhini, Hone and Liu (2013)	E-learning system (Web-based Learning Systems)	604 Students	✓	✓		✓	✓	Social Norm (Subjective norm)	Quality of Work Life	Facilitating conditions	Self-Efficacy						
Tarhini, Hone and Liu (2013)	E-learning system (Web-based Learning Systems)	569 Students	✓	✓		✓	✓	Perceived Quality of work life	Subjective Norm								
Tarhini, Hone and Liu(2014)	E-learning system	569Students	✓	✓		✓	✓	Subjective Norm	Quality of Work Life								
Tobing, Hamzah, Sura and Amin (2008)	E-learning system	314 Students	✓	✓		✓		System Adaptability									
Tseng and Hsia (2008)	E-learning system	204Employees	✓	✓		✓		Internal locus of control	Computer Self-Efficacy								
van Raaij and Schepers (2008)	E-learning system (virtual learning environment)	40 Managers enrolled on an Executive MBA program	✓	✓			✓	Personal Innovativeness in the domain of IT	Computer Anxiety	Subjective							
Wang and Wang (2009)	E-learning systems (Web-based Learning Systems)	268Instructors	✓	✓		✓	✓	Information quality	system quality	service quality	Subjective Norm	Self-Efficacy					
Williams and Williams (2009)	E-learning system (Web-based course management system)	237 Students	✓	✓	✓	✓		Incentive to use	Faculty encouragement	Peer encouragement	Awareness of system capabilities	Access	Technical support	Prior experience	Self-Efficacy		
Wu and Gao (2011)	E-learning technology/tools (Use of Clickers in Students Learning	101 Students	✓	✓	✓	✓		Perceived Enjoyment									
Wu and Zhang (2014)	E-learning system (E-learning 2.0 systems)	214 Employees	✓	✓	✓	✓		Reliability	Accessibility	Accuracy	Completeness	Sociality	Altruism				
Wu, Kuo and Wu (2013)	E-learning technology/tool (Use iPads for Learning)	392 Students	✓	✓		✓		iPad Self-Efficacy									
Yang and Lin (2011)	E-learning technology/tool (Facebook as an assisted learning tool)	377Employees	✓	✓			✓	Social Influence	Perceived Enjoyment	Concentration	Computer Self-Efficacy						
Yang, Fang, Chuang and Li (2011)	E-learning system (Digital Learning System)	120 Students	✓	✓	✓	✓		Content (Content Quality)	Interaction								
Yuen and Ma (2008)	E-learning system (Interactive Learning Network)	152In-service teachers	✓	✓		✓		Subjective Norm	Efficacy								
Zare and Yazdanparast (2013)	E-learning technology/tool (Information and Communication Technology)	379 Students	✓	✓		✓		Computer Playfulness	perceived enjoyment	Facilitative condition	Cognitive Absorption						
Zhang, Guo and Chen (2007)	E-learning system (an English e-learning system)	121 Students	✓	✓	✓	✓		Training impression	Tech. Facilitating condition	Perceived enjoyment	Innovativeness of IT	Job Relevance	Substitutability	Res. Facilitating conditions	Compatibility		
Zhang, Zhao and Tan (2008)	E-learning system	121 Students	✓	✓		✓	✓	Enjoyment									
Zhao and Tan (2010)	E-learning system	282 Students	✓	✓		✓		Enjoyment									

Table 2
Showing the most commonly used external factors.

Name of external factors	Used in number of the studies	Its relationship with TAM confirmed in number of studies
Self-Efficacy	51	45
Subjective Norm/Social Influence[a]	32	27
Perceived Enjoyment	23	19
Computer Anxiety	19	13
Experience	13	10

[a] Subjective Norm (SN) and Social Influence (SI) are similar and both focus on the influences of social factors on using technology (Venkatesh, Morris, Davis, & Davis, 2003, 451), because of this they are combined in this study.

Table 3
Showing the distribution of e-learning acceptance research papers.

Conference papers	Count of Papers (total = 107)
Papers presented at conferences	20
Journal papers	
Computers & Education	18
Computers in Human Behaviour	6
Behaviour and Information Technology	4
Turkish Online Journal of Educational Technology	3
International Journal of Information and Education Technology	2
International Journal of e-Education, e-Business, e-Management and e-Learning	2
Australasian Journal of Educational Technology	2
International Review of Research in Open and Distance Learning	2
Applied Computing and Informatics	1
Human Factors and Ergonomics in Manufacturing & Service Industries	1
Online Submission	1
Computer Science	1
The Electronic Journal of Information System in Developing Countries	1
Mediterranean Journal of Social Sciences MCSER	1
Knowledge Management & E-Learning: An International Journal	1
Knowledge-Based Systems	1
Turkish Online Journal of Distance Education-TOJDE	1
World Applied Sciences Journal	1
Online Information Review	1
The Social Sciences	1
Social and Behavioural Sciences	1
Evaluation and Program Planning	1
Information Systems Journal	1
Nurse Education Today	1
World Journal of Engineering and Pure & Applied Sciences	1
International Journal of Training and Development	1
Journal of Industrial and Intelligent Information	1
Journal of Applied Sciences	1
Journal of Technology and Science Education	1
Journal of Information Systems Education	1
International Journal of Mathematics and Computers in Simulation	1
Information Systems Journal	1
Educational Technology & Society	1
British Journal of Educational Technology	1
Automation in Construction	1
Information Development	1
Government Information Quarterly	1
The Malaysian Online Journal of Educational Technology	1
Asia–Pacific Journal of Teacher Education	1
Internet Research	1
Systems Engineering - Theory & Practice Online	1
Tsinghua Science & Technology	1
World Transactions on Engineering and Technology Education	1
Advances in Data Networks, Communications, Computers	1
African Journal of Business Management	1
International Review on Computers and Software	1
International Journal of Instructional Technology and Distance Learning	1
International Journal of Management Education	1
Journal of Language, Technology & Entrepreneurship in Africa	1
The Electronic Journal of Information Systems in Developing Countries	1
Journal of Basic and Applied Scientific Research	1
American Journal of Business Education	1
Life Science Journal	1
Information & Management	1
Communications of the IBIMA	1
Communication Education	1
Issues in informing science and information technology	1
Knowledge-Based Systems	1

Table 4
Showing the relationship between SE and PEOU of e-learning. Forty one studies have examined the relationship between SE and PEOU of e-learning, 33 (80%) of these studies have reported significant positive association between the two constructs.

Relationship between SE and PEOU of e-learning

					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Hsia et al. (2014)	E-learning system	Employees	223	YES	0.170		P < 0.05
Hsia and Tseng (2008)	E-learning system	Employees	233	YES	0.260		P < 0.05
Lee et al. (2011)	E-learning system	Employees	357	YES	0.601		p < 0.01
Lee et al. (2013)	E-learning system	Employees	332	YES	0.413		p < 0.01
Tseng and Hsia (2008)	E-learning system	Employees	204	YES	0.180		P < 0.05
Cheng (2011) CSE*	E-learning system	Employees	328	YES	0.130		p < 0.05
Cheng (2011) ISE*	E-learning system	Employees	328	YES	0.110		p < 0.05
Purnomo and Lee (2013)	E-learning system	Employees	306	NO	0.067		NS
Sum of Sample Size:			**2311**				
Average Path Coefficient:					**0.241**		
Standard Deviation:					**0.181**		
Abbad et al. (2009)	E-learning system	Students	486	YES		7.788	0.001
Al-Ammari and Hamad (2008)	E-learning system	Students	155	YES	0.360		0.000
Al-Mushasha (2013)	E-learning system	Students	244	YES	0.227		NR
Lee (2006)	E-learning system	Students	1085	YES	0.400		p < 0.001
Moghadam and Bairamzadeh (2009)	E-learning system	Students	155	YES	0.350		NR
Park (2009)	E-learning system	Students	628	YES	0.422	6.78**	NR
Pituch and Lee (2006)	E-learning system	Students	259	YES	0.318		p < 0.05
Lee et al. (2014) CSE*	E-learning system	Students	326	YES	0.268		p < 0.001
Lee et al. (2014) ISE*	E-learning system	Students	326	YES	0.130		P < 0.05
Al-Gahtani (2014)	E-learning system	Students	286	YES	0.176		p < 0.001
Bhatiasevi (2011)	E-learning system	Students	207	YES	0.560		p < 0.01
Agudo-Peregrina et al. (2013)	E-learning system	Students	81	NO	0.150		NS
Hussein et al. (2007)	E-learning System	Students	147	NO	0.090		NS
Rezaei et al. (2008)	E-learning system	Students	120	NO	NR		NS
Chow et al. (2012)	E-learning System	Students	206	YES	0.260		p < 0.001
Yuen and Ma (2008)	E-learning system (Interactive Learning Network)	Students	152	YES	0.300	2.87	p < 0.01
Lin et al. (2010)	E-learning system (multimedia e-learning system)	Students	214	YES	0.550		p < 0.01
Ali et al. (2013)	E-learning system (Second Life (SL))	Students	425	YES	0.370		p < 0.05
Shen and Eder (2009)	E-learning system (virtual world Second Life)	Students	77	YES	0.350		p < 0.01
Williams and Williams (2009)	E-learning system (Web-based course management system)	Students	237	NO	0.100	1.49	NS
Ifinedo (2006)	E-learning system (WebCT)	Students	72	YES	0.604		P < 0.05
Liu (2010)	E-learning system (Wikis)	Students	126	YES	0.860		NR
Chen et al. (2007)	E-Learning Systems (web-based learning platform)	Students	214	YES	0.550		p < 0.01
Sum of Sample Size:			**6228**				
Average Path Coefficient:					**0.352**		
Standard Deviation					**0.192**		
Chen and Tseng (2012)	E-learning system (Web-based learning system)	Teachers	402	YES	0.180		p < 0.001
Motaghian et al. (2013)	E-learning system (Web-based learning system)	Teachers	155	YES	0.390	5.41	NR
Wang and Wang (2009)	E-learning systems (Web-based Learning Systems)	Teachers	268	YES	0.240		p < 0.01
Sum of Sample Size:			**825**				
Average Path Coefficient:					**0.270**		
Standard Deviation					**0.108**		
Yang and Lin (2011)	E-learning technology/tool (Facebook as an assisted learning tool)	Employees	377	YES	0.435	7.668	P < 0.001
Wu et al. (2013)	E-learning technology/tool (Use iPads for Learning)	Students	392	YES	0.860		NR
Padilla-Meléndez, Garrido-Moreno and Aguila-Obra (2008)	E-learning Technology/tool. (E-collaboration)	Students	225	YES	0.313		p < 0.001
Mohamed and Abdul Karim (2012)	E-Learning technology/tools (Claroline- an Open Source E-learning)	Students	160	NO	0.699	0.05	NS
Aypay et al. (2012)	E-learning technology/tools (computer)	Students	754	NO	0.120	−3.51	NS
Park, Nam, et al. (2012)	E-learning technology/tools (m-learning)	Students	288	YES	0.467	6.26**	NR
Lau and Woods (2008)	E-learning technology/tools (multimedia learning object technology)	Students	342	NO	0.050		NS
Al-Ammary et al. (2014)	E-learning technology/tools (Social Networking)	Students	109	YES	0.342	3.55	NR
Brown et al. (2006)	E-learning technology/tools (web-based quiz tool)	Students	171	YES	0.605		0.000000
Sum of Sample Size:			**2441**				
Average Path Coefficient:					**0.432**		
Standard Deviation					**0.281**		
Overall- Sum of Sample Size:			**12,182**				
Overall- Average Path Coefficient:					**0.342**		
Overall- Standard Deviation:					**0.207**		

NR = not reported. NS = not significant. * Papers that have studied Computer Self-Efficacy and Internet Self-Efficacy separately in a single study.

analysis was performed. Correlation coefficient analysis describes the strength and direction of the linear relationship between two variables and the degree of correlation indicates the strength of an association between them (Pallant, 2005, p.114). Correlation coefficients can range from −1 to +1. The plus and minus signs indicate whether there is a positive correlation (as the independent variable increases, the dependant variable also increases), or a negative correlation (as the independent variable increases, the dependant variable decreases) (Pallant, 2005, p.114). A perfect correlation coefficient value of 1 or -1 between two variables indicates that a value of one variable can be determine precisely by knowing the value of the other variable. A correlation coefficient value of 0 means there is no relationship between the two variables. Correlation coefficient values can be used to determine the effects of an independent variable on a dependant variable. Cohen (1992) suggested that a small correlation coefficient (effect size) is around 0.1 in magnitude, a medium-sized correlation coefficient is roughly 0.3, and a large correlation coefficient is about 0.5 or larger. This guideline will be used to understand the strength of the relationships between the most commonly used external factors and learners' PEOU and PU of e-learning.

4.1. Self-Efficacy

In the context of e-learning the first most commonly used external factor of TAM found in this study is Self-Efficacy. Self-Efficacy (SE) refers to an individual's judgment of his or her own capability to perform a specific task (Bandura, 1982, p.391). In context of computer usage, Computer Self-Efficacy (CSE) is defined as one's belief about his/her ability to accomplish a particular task using a computer (Shen & Eder, 2009, p.226; Strong, Dishaw, & Bandy, 2006, p.105). CSE can affect people's behavioural intentions to use computers, because people who consider computers too complex and believe that they do not have the ability to use computers will avoid them (Igbaria & Iivari, 1995, p.590). In contrast, "the higher the individual's computer Self-Efficacy, the higher his/her use of computers" (Compeau & Higgins, 1995a, p.196). This suggests that students who have higher e-learning Self-Efficacy are more likely to use e-learning (Yuen & Ma, 2008, p.233; Moghadam & Bairamzadeh, 2009, p.1660; Hsia & Tseng, 2008, p.42; Lee, 2006, p.523) and students who have lower e-learning Self-Efficacy may avoid using it.

Previous studies show that SE plays a critical role in influencing learner's perceived ease of use of e-learning technologies or systems. Out of the 107 studies analysed in this paper, 41 studies have investigated the relationship between SE and PEOU of e-learning, 33 (80%) of these papers have found significant positive relationship between the two constructs (SE and PEOU) (shown in Table 4).

Table 4, above, shows that across all the user types and e-learning types, the average effect size of SE on PEOU is 0.342, with the average effect size of SE on students' PEOU of e-learning systems **0.352**. This is a medium effect size according to the guidelines proposed by Cohen (1992), and therefore the relationship between SE and PEOU is included in the proposed GETAMEL (shown in Fig. 2).

In regards to the relationship between SE and PU, 17 out of 27 studies (63%) indicated a lack of positive significant association between the two constructs (shown in Table 5), including ten studies that found significant correlation between SE and PEOU, but not between SE and PU (see Table 5). Across all user types and e-learning types, the average effect size of SE on PU is 0.088. However the average effect size of SE on students' PU of e-learning system is **0.174**, this is between a small and a medium effect size according to the guidelines proposed by Cohen (1992), and therefore the relationship between SE and PU is also included in the proposed GETAMEL (shown in Fig. 2).

4.2. Subjective norm

Subjective Norm (SN) refers to "the person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Venkatesh et al., 2003, p.452). In regards to e-learning system use in educational settings, SN is not about social influences toward decision making (i.e. whether or not performing a given behaviour), but it is related to how the opinions from peers, teachers and educational institution

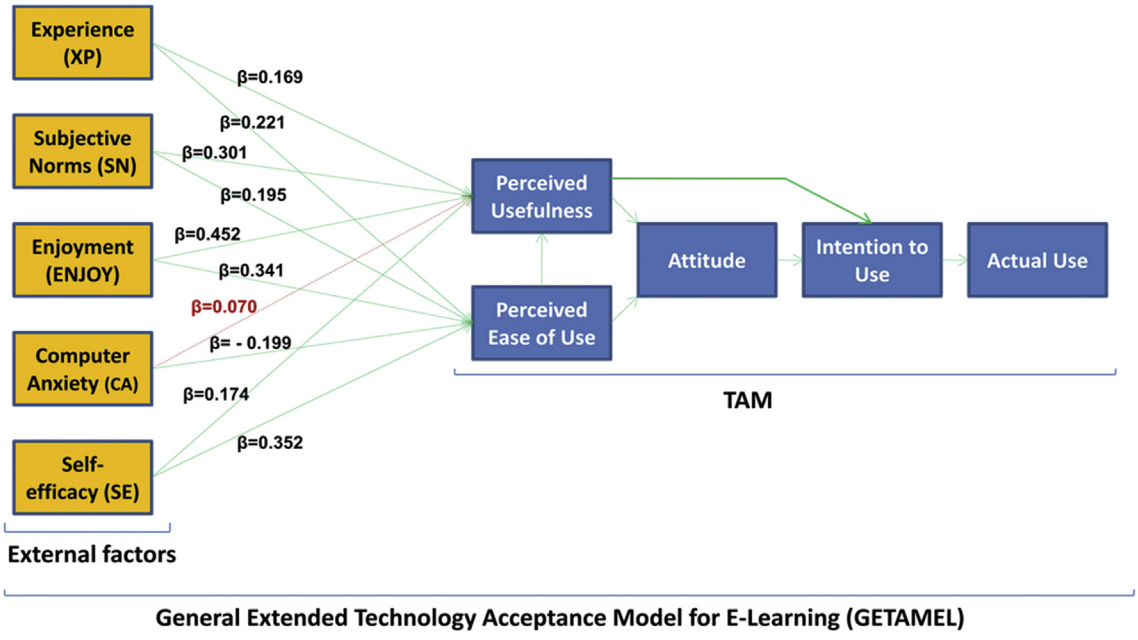

Fig. 2. GETAMEL with the average path coefficients (β) found between the 5 external factors and students' Perceived Ease of Use and Usefulness of e-learning systems.

Table 5
Showing the relationship between SE and PU of e-learning. Twenty seven studies have examined the relationship between SE and PU of e-learning, 17 (63%) of these studies have reported a lack of significant positive relationship between the two constructs.

Relationship between SE and PU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Hsia and Tseng (2008)	E-learning system	Employees	233	YES	0.140		P < 0.05
Cheng (2011) CSE*	E-learning system	Employees	328	NO	0.020		p > 0.05
Cheng (2011) ISE*	E-learning system	Employees	328	NO	0.004		p > 0.05
Lee et al. (2011)	E-learning system	Employees	357	NO	−0.145		NS
Lee et al. (2013)	E-learning system	Employees	332	NO	−0.071		NS
Ma et al. (2013)	E-learning system	Employees (Nurses)	650	NO	0.053		NS
Purnomo and Lee (2013)	E-learning system	Employees	306	NO	0.075		NS
Sum of Sample Size:			**2534**				
Average Path Coefficient:					**0.011**		
Standard Deviation:					**0.095**		
Al-Ammari and Hamad (2008)	E-learning system	Students	155	YES	0.294		0.000
Al-Mushasha (2013)	E-learning system	Students	224	YES	0.236		NR
Hussein et al. (2007)	E-learning System	Students	147	YES	0.370		p < 0.01
Park (2009)	E-learning system	Students	628	YES	0.234	3.96**	NR
Lee et al. (2014) ISE*	E-learning system	Students	326	YES	0.165		p < 0.05
Lee et al. (2014) CSE*	E-learning system	Students	326	NO	−0.041		NS
Bhatiasevi (2011)	E-learning system	Students	207	NO	−0.210		NS
Lee (2006)	E-learning system	Students	1085	NO	0.060		NS
Pituch and Lee (2006)	E-learning system	Students	259	NO	−0.100		NS
Abbad et al. (2009)	E-learning system	Students	486	NO	NR	1.616	0.106
Chow et al. (2012)	E-learning System	Students	206	YES	0.390		p < 0.001
Ifinedo (2006)	E-learning system (WebCT)	Students	72	YES	0.584		P < 0.05
Liu (2010)	E-learning system (Wikis)	Students	126	NO	0.106		NS
Sum of Sample Size:			**4247**				
Average Path Coefficient:					**0.174**		
Standard Deviation:					**0.226**		
Yuen and Ma (2008)	E-learning system (Interactive Learning Network)	Teachers	152	NO	−0.070	−0.76	NS
Chen and Tseng (2012)	E-learning system (Web-based learning system)	Teachers	402	YES	0.130		p < 0.05
Motaghian et al. (2013)	E-learning system (Web-based learning system)	Teachers	155	NO	0.040	0.38	NS
Sum of Sample Size:			**709**				
Average Path Coefficient:					**0.033**		
Standard Deviation:					**0.100**		
Mohamed and Abdul Karim (2012)	E-Learning technology/tools (Claroline- an Open Source E-learning)	Students	160	NO	−0.132	0.112	NS
Aypay et al. (2012)	E-learning technology/tools (computer)	Students	754	YES	−0.066	−2.57	NR
Park, Nam, et al. (2012)	E-learning technology/tools (m-learning)	Students	288	NO	0.062	0.88	NS
Lau and Woods (2008)	E-learning technology/tools (multimedia learning object technology)	Students	342	NO	0.014		NS
Al-Ammary et al. (2014)	E-learning technology/tools (Social Networking)	Students	109	YES	0.212	2.430	NR
Sum of Sample Size:			**1653**				
Average Path Coefficient:					**0.018**		
Standard Deviation:					**0.131**		
Lee and Lehto (2013)	E-learning technology/tools (YouTube for procedural learning)	YouTube users	432	YES	0.099		p < 0.05
Overall- Sum of Sample Size:			**9575**				
Overall- Average Path Coefficient:					**0.088**		
Overall- Standard Deviation:					**0.179**		

NR = not reported. NS = not significant. * Papers that have studied Computer Self-Efficacy and Internet Self-Efficacy separately in a single study.

policies may influence student's tendency to use an e-learning system, therefore, Agudo-Peregrina et al. (2013, p.3) have redefine the Subjective Norm as "the extent to which a student perceives a pressure from members in his or her environment to use e-learning systems". It is argued that if a person perceives that people who are important to him/her (such as peers and teachers) think he/she should use an e-learning system, then the person will incorporate their beliefs into his/her own beliefs system, and consequently perceives the system more useful in its purpose (Cheng, 2011, p.277; Van Raaij & Schepers, 2008, p.482).

The effects of Subjective Norm on learners' e-learning acceptance and use have been investigated intensively in the literature. The empirical evidence presented in Table 6 shows that 19 out of 22 studies (86%) that have investigated correlation between SN/SI and PU have found a significant positive relationship between the two constructs.

Across all the user types and e-learning types, the average effect size of SN/SI on PU is 0.279. The average effect size of SN/SI on students' PU of e-learning system is **0.301**, which is a medium effect size according to the guidelines proposed by Cohen (1992). Thus, the relationship between SN/SI and PU is included in the proposed GETAMEL (shown in Fig. 2).

Prior literature (4 out of 6 studies shown in Table 7) show that SN/SI affected users' perceived ease of use of e-learning. Across all the user types and e-learning types, the average effect size of SN/SI on PEOU is 0.228. The average effect size of SN/SI on students' PEOU of e-learning systems is **0.195**, which is between a small and medium effect size according to the guidelines proposed by Cohen (1992). Because of this, the relationship between these two factors is also included in the proposed GETAMEL (shown in Fig. 2).

Table 6
Showing the relationship between SN/SI and PU of e-learning. Twenty two studies have examined the relationship between SN/SI and PU of e-learning, 19 (86%) of these studies have reported significant positive association between the two constructs.

Relationship between SN/SI and PU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Cheng (2011) Interpersonal influence*	E-learning system	Employees	328	YES	0.120	3.120	$p < 0.05$
Cheng (2011) External influence*	E-learning system	Employees	328	YES	0.120	3.200	$p < 0.05$
Lee et al. (2011)	E-learning system	Employees	357	YES	0.187		$p < 0.05$
van Raaij and Schepers (2008)	E-learning system (virtual learning environment)	Employees	40	YES	0.270		$P < 0.01$
Karaali et al. (2011)	E-learning system (web-based learning system)	Employees	546	YES	0.540		$p < 0.001$
Park, Son, et al. (2012)	E-learning system (Web-based training systems)	Employees	408	YES	0.210	4.781	$p < 0.001$
Yang and Lin (2011)	E-learning technology/tool (Facebook as an assisted learning tool)	Employees	377	YES	0.447	7.682	$p < 0.001$
Sum of Sample Size:			**2384**				
Average Path Coefficient:					**0.271**		
Standard Deviation:					**0.163**		
Al-Ammari and Hamad (2008)	E-learning system	Students	155	YES	0.364		$p < 0.001$
Lee (2006)	E-learning system	Students	1085	YES	0.250		$p < 0.001$
Moghadam and Bairamzadeh (2009)	E-learning system	Students	155	YES	0.430		NR
Park (2009)	E-learning system	Students	628	YES	0.461	9.17**	NR
Al-Gahtani (2014)	E-learning system	Students	286	YES	0.150		$p < 0.01$
Agudo-Peregrina et al. (2013)	E-learning system	Students	81	NO	0.080		NS
Abbad et al. (2009)	E-learning system	Students	486	NO		2.647	0.008
Farahat (2012)	E-learning system (online learning)	Students	121	YES	0.369		$P < 0.01$
Sum of Sample Size:			**2997**				
Average Path Coefficient:					**0.301**		
Standard Deviation:					**0.144**		
De Smet et al. (2012)	E-learning system (learning managementsystems)	Teachers	505	YES	0.310		$p < 0.001$
Motaghian et al. (2013)	E-learning system (Web-based learning system)	Teachers	115	YES	0.310	2.830	NR
Yuen and Ma (2008)	E-learning system (Interactive Learning Network (ILN))	Teachers	152	YES	0.540	4.690	$p < 0.001$
Wang and Wang (2009)	E-learning systems (Web-based Learning Systems)	Teachers	268	YES	0.300		$p < 0.01$
Sum of Sample Size:			**1040**				
Average Path Coefficient:					**0.365**		
Standard Deviation:					**0.117**		
Rejón-Guardia et al. (2013)	E-learning technology/tools (microblogging)	Students	135	YES	0.180	$T > 1.96$	$p < 0.005$
Park, Nam, et al. (2012)	E-learning technology/tools (m-learning)	Students	288	YES	0.244	2.88*	NR
Hei and Hu (2011)	E-learning technology/tools (m-learning)	Students	253	NO	0.017	−0.255	NS
Sum of Sample Size:			**676**				
Average Path Coefficient:					**0.147**		
Standard Deviation:					**0.117**		
Martin (2012)	E-learning technology/tools (Social Networking in e-Learning)	Students and educators	210	YES	0.240		$p < 0.001$
Overall- Sum of Sample Size:			**7307**				
Overall- Average Path Coefficient:					**0.279**		
Overall- Standard Deviation:					**0.145**		

NR = not reported. NS = not significant. * Papers that have broken down Social Influence into Interpersonal Influence and External Influence and studied both in a single study.

4.3. Perceived enjoyment

The concept of enjoyment is based on intrinsic motivation (Ryan & Deci, 2000) and in the context of information systems usage, it is explained as "the extent to which the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Park, Son, et al., 2012, p.379). Perceived Enjoyment is an important factor in explaining e-learning adoption. Previous research showed that perceived enjoyment significantly impacted both perceived ease of use (shown in Table 8) and perceived usefulness (shown in Table 9) of e-learning. Previous research also showed that perceived enjoyment increased students' intention to use e-learning (e.g. Cheng, 2012; Yang & Lin, 2011; Zare & Yazdanparast, 2013).

As shown in Table 8, eight out of eleven studies (73%) found a significant positive relationship between Enjoyment and PEOU of e-learning. In regards to the relationship between Enjoyment and PU eight out of eight studies (100%) found a significant positive relationship between the two constructs (shown in Table 9). If a student believes that using an e-learning system is enjoyable then he or she is therefore more likely to have positive perceptions about the ease of use and usefulness of the system (Al-Aulamie et al., 2012; Chen et al., 2013; Zare & Yazdanparast, 2013) and a higher degree of intention to use the system (Lee et al.,2005; Cheng, 2011, 2012).

Across all the user types and e-learning types, the average effect size of Perceived Enjoyment on PEOU is 0.260. The average effect size of Perceived Enjoyment on students' PEOU of e-learning system is **0.341**, which is a medium effect size according to the guidelines proposed by Cohen (1992). Because of this, the relationship between Perceived Enjoyment and PEOU will be included in the proposed GETAMEL (shown in Fig. 2).

Across all the user types and e-learning types, the average effect size of Perceived Enjoyment on PU is 0.418. More specifically, the average effect size of Perceived Enjoyment on students' PU of e-learning systems is **0.452** which is almost a large effect size according to guidelines proposed by Cohen (1992). Because of this, the relationship between Perceived Enjoyment and PU will be included in the proposed GETAMEL (shown in Fig. 2).

Table 7
Showing the relationship between SN/SI and PEOU of e-learning. Six studies have examined the relationship between SN/SI and PEOU of e-learning, four (67%) of these studies have reported significant positive association between the two constructs.

Relationship between SN/SI and PEOU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Lee et al. (2011)	E-learning system	Employees	357	YES	0.392		$p < 0.01$
Park (2009)	E-learning system	Students	628	NO	−0.02	−0.36	NS
Farahat (2012)	E-learning system (online learning)	Students	121	YES	0.410		$P < 0.01$
Sum of Sample Size:			**749**				
Average Path Coefficient:					**0.195**		
Standard Deviation:					**0.304**		
Yuen and Ma (2008)	E-learning system (Interactive Learning Network)	Teachers	152	YES	0.360	3.2	$p < 0.01$
Motaghian et al. (2013)	E-learning system (Web-based learning system)	Teachers	115	YES	0.210	2.63	NR
Sum of Sample Size:			**267**				
Average Path Coefficient:					**0.285**		
Standard Deviation:					**0.106**		
Park, Nam, et al. (2012)	E-learning technology/tools (m-learning)	Students	288	NO	0.014	0.016	NS
Overall- Sum of Sample Size:			**1661**				
Overall- Average Path Coefficient:					**0.228**		
Overall- Standard Deviation:					**0.192**		

NR = not reported. NS = not significant.

4.4. Computer anxiety

Anxiety is explained as "evoking anxious or emotional reactions when it comes to performing a behavior" (Venkatesh et al., 2003, p.432). In the context of computer usage, computer anxiety is described as "the tendency of an individual to be uneasy, apprehensive, or fearful about the current or future use of computers in general" (Igbaria & Parasuraman, 1989, p.375). Many researchers who have studied the role of computer anxiety in e-learning acceptance or use, have concluded that computer anxiety is associated with avoidance or less use of e-learning systems or technologies (including: Park, Son, et al., 2012; Purnomo & Lee, 2013; Chen & Tseng, 2012). Computer anxiety plays an important role in e-learning adoption in higher education institutions (Alenezi et al., 2010). This is because individuals who are anxious about using computers are more likely to be reluctant to adopt e-learning systems (Al-alak & Alnawas, 2011, p.208).

As shown in Table 10, ten out of seventeen studies (59%) have confirmed that Computer Anxiety negatively influences user's Perceived Ease of Use of e-learning.

Across all the user types and e-learning types, the average negative effect size of Computer Anxiety on PEOU is −0.238 (shown in Table 10). The average effect size of Computer Anxiety on students' PEOU of e-learning system is **-0.199**, which is between a small and medium effect size according to guidelines proposed by Cohen (1992). Because of this the negative link between Computer Anxiety and PEOU is included in the proposed GETAMEL (shown in Fig. 2).

Table 8
Showing the relationship between Perceived Enjoyment and PEOU of e-learning. Eleven studies have examined the relationship between Enjoyment and PEOU of e-learning, eight (73%) of the studies have confirmed significant positive association between the two constructs.

Relationship between perceived enjoyment and PEOU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Park, Son, et al. (2012)	E-Learning system (web-based training systems)	Employees	408	NO	0.067	1.218	NS
Al-Aulamie et al. (2012)	E-learning system	Students	51	YES	0.300		$p < 0.05$
Al-Gahtani (2014)	E-learning system	Students	286	YES	0.201		$p < 0.001$
Shyu and Huang (2011)	E-learning system (e-government learning) to facilitate learning	Students	307	YES	0.884		$p < 0.001$
Arenas-Gaitan et al. (2010)	E-learning system (E-learning Platform)	Students	189	YES	0.078		$p = 0.05$
Lefievre (2012)	E-learning system (MediaPlus)	Students	291	NO	NS		NS
Chen et al. (2013)	E-learning system (web-based instruction system)	Students	218	YES	0.240		$p < 0.01$
Zare and Yazdanparast (2013)	E-learning technology/tool (Information and Communication Technology)	Students	379	YES	0.343	$t = 6.041$	$P = 0.01$
Sum of Sample Size:			**1721**				
Average Path Coefficient:					**0.341**		
Standard Deviation:					**0.281**		
Martinez-Torres et al. (2008)	E-learning technology/tools	Students	220	YES	0.167		$p < 0.001$
Al-Ammary et al. (2014)	E-learning technology/tools (Social Networking)	Students	109	YES	0.273	2.56	NR
Brown et al. (2006)	E-learning technology/tools (web-based quiz tool)	Students	171	NO	0.044		0.385645
Sum of Sample Size:			**500**				
Average Path Coefficient:					**0.161**		
Standard Deviation:					**0.115**		
Overall- Sum of Sample Size:			**2629**				
Overall- Average Path Coefficient:					**0.260**		
Overall- Standard Deviation:					**0.242**		

NR = not reported. NS = not significant.

Table 9
Showing the relationship between Perceived Enjoyment and PU of e-learning. Eight studies have examined the relationship between Perceived Enjoyment and PU of e-learning, all the eight (100%) studies have found significant positive relationship between the two constructs.

Relationship between perceived enjoyment and PU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Park, Son, et al. (2012)	E-learning system (Web-based training systems)	Employees	408	YES	0.294	6.197	$p < 0.001$
Al-Aulamie et al. (2012)	E-learning system	Students	51	YES	0.550		$p < 0.01$
Zhang et al. (2007)	E-learning system (an English e-learning system)	Students	121	YES	0.492		$p < 0.0001$
Lin et al. (2010)	E-learning system (multimedia e-learning system)	Students	214	YES	0.400		$p < 0.01$
Chen et al. (2013)	E-learning system (web-based instruction system)	Students	218	YES	0.420		$p < 0.01$
Chen et al. (2007)	E-Learning Systems (web-based learning platform)	Students	214	YES	0.400		$p < 0.01$
Sum of Sample Size:			**818**				
Average Path Coefficient:					**0.452**		
Standard Deviation:					**0.066**		
Zare and Yazdanparast (2013)	E-learning technology/tool (Information and Communication Technology)	Students	379	YES	0.230	$t = 4.040$	$P = 0.01$
Wu and Gao (2011)	E-learning technology/tools (Use of Clickers in Students Learning	Students	101	YES	0.554		$p < 0.01$
Sum of Sample Size:			**480**				
Average Path Coefficient:					**0.392**		
Standard Deviation:					**0.229**		
Overall- Sum of Sample Size:			**1706**				
Overall- Average Path Coefficient:					**0.418**		
Overall- Standard Deviation:					**0.115**		

In regards to relationships between Computer Anxiety and PU, only two out of seven studies found a significant negative link between Computer Anxiety and Perceived Usefulness (shown in Table 11). Across all the user types and e-learning types, the average effect size of Computer Anxiety on PU is +0.002. The average effect size of Computer Anxiety on students' PU of e-learning systems is **+0.070**. This means there is no negative relationship between the two constructs. This relationship

Table 10
Showing the relationship between Computer Anxiety and PEOU of e-learning. Seventeen studies have examined the relationship between Computer Anxiety and PEOU of e-learning, ten (59%) of these studies have reported significant negative association between the two constructs.

Relationship between computer anxiety and PEOU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Purnomo and Lee (2013)	E-learning system	Employees	306	NO	−0.128		NS
van Raaij and Schepers (2008)	E-learning system (virtual learning environment)	Employees	40	YES	−0.530		$p < 0.001$
Calisir, AltinGumussoy, Bayraktaroglu, and Karaali (2014)	E-learning system (Web based learning system)	Employees	546	YES	−0.240		$p < 0.001$
Karaali et al. (2011)	E-learning system (web-based learning system)	Employees	546	YES	−0.340		$p < 0.001$
Park, Son, et al. (2012)	E-learning system (Web-based training systems)	Employees	408	YES	−0.178	$t = -3.539$	$p < 0.001$
Sum of Sample Size:			**1846**				
Average Path Coefficient:					**−0.310**		
Standard Deviation:					**0.171**		
Al-Gahtani (2014)	E-learning system	Students	286	YES	−0.105		$p < 0.05$
Agudo-Peregrina et al. (2013) Lifelong learning Setting	E-learning system	Students	81	YES	−0.270		$p < 0.001$
Agudo-Peregrina et al. (2013) Higher education Setting	E-learning system	Students	81	NO	−0.060		NS
Rezaei et al. (2008)	E-learning system	Students	120	NO	NS		NS
Lefievre (2012)	E-learning system (MediaPlus)	Students	291	YES	−0.218		$p < 0.001$
Saadé and Kira (2006)	E-learning system (Online systems for learning)	Students	114	YES	−0.517		$p \leq 0.05$
Ali et al. (2013)	E-learning system (Second Life (SL))	Students	425	YES	−0.310		$p < 0.05$
Shen and Eder (2009)	E-learning system (virtual world Second Life)	Students	77	NO	NS		NS
Ifinedo (2006)	E-learning system (WebCT)	Students	72	NO	−0.145		NS
Liu (2010)	E-learning system (Wikis)	Students	126	NO	0.034		NS
Sum of Sample Size:			**1673**				
Average Path Coefficient:					**−0.199**		
Standard Deviation:					**0.171**		
Chen and Tseng (2012)	E-learning system (Web-based learning system)	Teachers	402	YES	−0.520		$p < 0.001$
Mohamed and Abdul Karim (2012)	E-learning technology/tools (Claroline- an Open Source E-learning)	Students	160	NO	0.020	0.232	NS
Overall- Sum of Sample Size:			**4081**				
Overall- Average Path Coefficient:					**−0.238**		
Overall- Standard Deviation:					**0.190**		

NS = not significant.

Table 11
Showing the relationship between Computer Anxiety and PU of e-learning. Seven studies have examined the relationship between Computer Anxiety and PU of e-learning, five (71%) of the studies have indicated a lack of significant relationship between the two constructs.

Relationship between computer anxiety and PU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Purnomo and Lee (2013)	E-learning system	Employees	306	YES	−0.193		$p < 0.01$
Park, Son, et al. (2012)	E-learning system (Web-based training systems)	Employees	408	YES	−0.091	$t = -2.250$	$p < 0.05$
Sum of Sample Size:			**714**				
Average Path Coefficient:					**−0.142**		
Standard Deviation:					**0.072**		
Saadé and Kira (2006)	E-learning system (Online systems for learning)	Students	114	NO	0.160		NS
Ifinedo (2006)	E-learning system (WebCT)	Students	72	NO	−0.046		NS
Liu (2010)	E-learning system (Wikis)	Students	126	NO	0.097		NS
Sum of Sample Size:			**312**				
Average Path Coefficient:					**0.070**		
Standard Deviation:					**0.106**		
Chen and Tseng (2012)	E-learning system (Web-based learning system)	Teachers	402	NO	0.010		NS
Mohamed and Abdul Karim (2012)	E-Learning technology/tools (Claroline- an Open Source E-learning)	Students	160	NO	0.080	0.127	NS
Overall- Sum of Sample Size:			**1588**				
Overall- Average Path Coefficient:					**0.002**		
Overall- Standard Deviation:					**0.122**		

NS = not significant.

therefore will not be included in the proposed GETAMEL (shown in Fig. 2).

4.5. Experience

Experience (XP) is regarded as "the best-studied moderator variable in TAM" according to King and He (2006, p.747). Researchers demonstrated that experience played a vital role in explaining e-learning adoption (Al-alak & Alnawas, 2011, p.214). Computer related experience is defined as "the amount and type of computer skills a person acquires over time" (Smith, Caputi, Crittenden, Jayasuriya, & Rawstorne, 1999, p.227). Individuals with higher computer related experience, such as those using computers, internet and email and saving and locating files, are more likely to have more favourable feelings towards the ease of use and usefulness of an e-learning system (Lee et al., 2013, 184; Purnomo & Lee, 2013, p.145). Related research shows that computer related experience affects learners' intention to use various e-learning technologies or systems (Premchaiswadi et al., 2012; Williams & Williams, 2009; De Smet et al., 2012).

Experience is the fifth most commonly used external factor of TAM in the context of e-learning acceptance or use (shown in

Table 12
Showing the relationship between Experience and PEOU of e-learning. Ten studies have examined the relationship between Experience and PEOU of e-learning, 5 (50%) of these studies have confirmed significant positive relationship between the two constructs.

Relationship between experience and PEOU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Lee et al. (2013)	E-learning system	Employees	332	YES	0.149		$p < 0.01$.
Lee et al. (2011)	E-learning system	Employees	357	YES	0.121		$p < 0.05$.
Purnomo and Lee (2013)	E-learning system	Employees	306	YES	0.363		$p < 0.001$.
Sum of Sample Size			**995**				
Average Path Coefficient					**0.211**		
Standard Deviation:					**0.132**		
Abbad et al. (2009)	E-learning system	Students	486	YES	NR	4.199	0.001
Pituch and Lee (2006)	E-learning system	Students	259	NO	0.101		NS
Rezaei et al. (2008)	E-learning system	Students	120	NO	NS		NS
Williams and Williams (2009)	E-learning system (Web-based course management system)	Students	237	NO	0.340	1.94	NS
Sum of Sample Size			**1102**				
Average Path Coefficient					**0.221**		
Standard Deviation:					**0.169**		
De Smet et al. (2012)	E-learning system (learning managementsystem)	Teachers	**505**	YES	**0.060**		$p < 0.001$.
Lau and Woods (2008)	E-learning technology/tools (multimedia learning object technology)	Students	**342**	NO	**−0.002**		NS
Martin (2012)	E-learning technology/tools (Social Networking in e-Learning)	Students and educators	**210**	NO	**0.170**	1.29	0.197
Overall- Sum of Sample Size			**3154**				
Overall- Average Path Coefficient					**0.163**		
Overall- Standard Deviation:					**0.128**		

NR = not reported. NS = not significant.

Table 13
Showing the relationship between Experience and PU of e-learning. Eight studies have examined the relationship between Experience and PU of e-learning, four (50%) of these studies have shown significant positive relationship between the two constructs.

Relationship between experience and PU of e-learning							
					Evidence of significance		
Study	E-Learning type	User type	Sample size	Significant?	Beta	t-value	p-value
Lee et al. (2011)	E-learning system	**Employees**	357	NO	−0.113		NS
Lee et al. (2013)	E-learning system	**Employees**	332	YES	0.291		$p < 0.01$
Purnomo and Lee (2013)	E-learning system	**Employees**	306	YES	0.259		$p < 0.001$
Sum of Sample Size:			**995**				
Average Path Coefficient:					**0.146**		
Standard Deviation:					**0.225**		
Rezaei et al. (2008)	E-learning system	**Students**	120	YES	0.252		$p < 0.05$
Pituch and Lee (2006)	E-learning system	**Students**	259	NO	0.086		NS
Abbad et al. (2009)	E-Learning system	**Students**	486	NO	NR	−2.28	0.023
Sum of Sample Size:			**865**				
Average Path Coefficient:					**0.169**		
Standard Deviation:					**0.117**		
Lau and Woods (2008)	E-learning technology/tools (multimedia learning object technology)	Students	**342**	NO	**0.002**		NS
Martin (2012)	E-learning technology/tools (Social Networking in e-Learning)	Students and educators	**210**	YES	**0.360**	4.294	$p < 0.001$
Overall- Sum of Sample Size:			**2412**				
Overall- Average Path Coefficient:					**0.162**		
Overall-Standard Deviation:					**0.173**		

NR = not reported. NS = not significant.

Table 2). Several studies have confirmed that experience influences both users' perceived ease of use (shown in Table 12) and usefulness (shown in Table 13) of e-learning.

Across all the user types and e-learning types, the average positive effect size of Experience on PEOU is 0.163. The average effect size of Experience on students' PEOU of e-learning systems is **0.221**, which is between a small and medium effect size according to guidelines proposed by Cohen (1992). Because of this, the link between Experience and PEOU is included in the proposed GETAMEL (shown in Fig. 2).

Across all the user types and e-learning types, the average positive effect size of Experience on PU is 0.162 (shown in Table 13). The average effect size of Experience on students' PU of e-learning systems is **0.169**, which is also between a small and medium effect size according to guidelines proposed by Cohen (1992). Because of this the link between Experience and PU is included in the proposed GETAMEL (shown in Fig. 2).

5. Summary of results

The most commonly used external factors, whose relationship with TAM has been confirmed in 10 or more of the 107 studies considered within this meta-analysis, are SE, SN, ENJOY, CA and XP (shown in Fig. 2).

As the studies containing the commonly used external factors covered a range of e-learning technology types and e-learning user types, they were categorised. These categories were then analysed to determine the strength of the relationships between the commonly used external factors and students' PEOU and PU of e-learning systems.

Based on the findings of this study the best predictor of student's PEOU of e-learning systems is Self-Efficacy ($\beta = 0.352$), followed by Enjoyment ($\beta = 0.341$), Experience ($\beta = 0.221$), Computer Anxiety ($\beta = -0.199$) and Subjective Norm ($\beta = 0.195$).

The best predictor of student's PU of e-learning systems is Enjoyment ($\beta = 0.452$), followed by Subjective Norm ($\beta = 0.301$), Self-Efficacy ($\beta = 0.174$) and Experience ($\beta = 0.169$).

Based on the relationships found between the five most commonly used external factors and students' PEOU and/or PU of e-learning systems, a model, GETAMEL, is proposed which identifies the key external factors for acceptance of e-learning.

We have also learned that the effect sizes between the external factors and PEOU and PU of e-learning across all the user types and e-learning technology types (all the groups), and between the

Table 14
Comparison of the effect sizes (path coefficient) between the external factors and PEOU and PU across all the e-learning types and user types versus the effect sizes between the external factors and students' PEOU and PU of e-learning systems.

Commonly used external factors of TAM	Effect size (β)between the external factors and PEOU and PU across all the user types and e-learning types	Effect size(β) between the external factors and students PEOU and PU of e-learning systems	TAM's two main constructs
SE	0.342	0.352	PEOU
SN	0.228	0.195	PEOU
ENJOY	0.260	0.341	PEOU
CA	−0.238	−0.199	PEOU
XP	0.163	0.221	PEOU
SE	0.088	0.174	PU
SN	0.279	0.301	PU
ENJOY	0.418	0.452	PU
CA	0.018	0.070	PU
XP	0.162	0.169	PU

external factors and students' PEOU and PU of e-learning systems (the students and e-learning system groups) were very similar. The effect size between ENJOY and PU was the highest for both groups. The effect size between CA and PU was the lowest for both groups (shown in Table 14).

5.1. Limitations

Keeping in mind that technology has changed during the last 10 years and the possibility of significant technological changes in the future (Hayati & Hashemy, 2013, p.181), the findings of this study should be used with caution. Investigating how technological changes may influence learners' behaviour towards using e-learning is a clear avenue for future research.

As indicated in the introduction, there is also an important limitation to the utility of the published studies considered in this meta-analysis, where the vast majority of the publications do not specify error values and only state significance levels. This is all the more surprising given the quality of the journal papers where these studies are published. To enable similar meta-analyses to be conducted in future it is therefore recommended that journal reviewers should insist on error values being published so that bias checking can be performed.

6. Summary

The objectives of this study were to: (1) systematically review recent e-learning adoption studies that have extended TAM, (2) identify the most commonly used external factors among these studies, (3) identify the strengths of the relationship between the most commonly used external factors and students' PEOU and PU of e-learning systems and (4) propose a general extended TAM for e-learning.

This study analysed 107 recent research papers (87 published journal papers and 20 papers presented at conferences) that have extended and used TAM in the context of e-learning adoption. In total these 107 studies studied 152 external factors of TAM. To identify the most commonly used external factors of TAM among these studies and to have confidence in the relationship between the external factors and TAM's constructs the authors selected external factors that had been confirmed in 10 or more of the studies. As results, Self-Efficacy, Subjective Norm, Perceived Enjoyment, Computer Anxiety and Experience were classified as most commonly used external factors.

To evidence the significant or non-significant relationship between the most commonly used external factors and TAM's PEOU and PU, the authors categorised the studies containing the external factors into e-learning technology types and e-learning user types, and then recorded the effect size (path coefficient), and significance level (t-value and/or p-value) between the variables. Results show that the best predictor of student's PEOU of e-learning systems is Self-Efficacy ($\beta = 0.352$), followed by Enjoyment ($\beta = 0.341$), Experience ($\beta = 0.221$), Computer Anxiety ($\beta = -0.199$) and Subjective Norm ($\beta = 0.195$). The best predictor of student's PU of e-learning systems is Enjoyment ($\beta = 0.452$), followed by Subjective Norm ($\beta = 0.301$), Self-Efficacy ($\beta = 0.174$) and Experience ($\beta = 0.169$). These relationships are summarised in the general extended technology acceptance model for e-learning (GETAMEL), as shown in Fig. 2. Having developed this model the next stage of the research is to validate the model empirically in order for it to be used as a predictive tool.

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