INDERSCIENCE PUBLISHERS
Linking academia, business and industry through research

International Journal of Learning Technology

ISSN online: 1741-8119 - ISSN print: 1477-8386
https://www.inderscience.com/ijlt

Modelling e-learning quality, self-efficacy and students' behaviour

Tejas R. Shah, Poonam Chhaniwal

DOI: 10.1504/IJLT.2024.10063337

Article History:

Received:	22 June 2022
Last revised:	30 December 2022
Accepted:	28 February 2023
Published online:	08 April 2024

Modelling e-learning quality, self-efficacy and students' behaviour

Tejas R. Shah and Poonam Chhaniwal*

Institute of Management,
Nirma University,
Ahmedabad, Gujarat, 382481, India
Email: tejasmgmt27@gmail.com
Email: chhaniwalpoonam@gmail.com
*Corresponding author

Abstract: This study empirically tested a model examining the effect of four e-learning quality dimensions, i.e., information quality, system quality, service quality, and instructor quality as well as students' self-efficacy on e-learning behaviour – satisfaction and continued intentions that further affect students' academic performance. The research model is examined for e-learning systems at higher education institutions (HEIs). Data were collected from four cities of Gujarat, India, i.e., Ahmedabad, Vadodara, Surat and Rajkot. The sample size consists of 832 students and information was collected using a self-administered online survey. Data is analysed through structured equation modelling in SPSS AMOS (v.23). The findings offer direction for HEIs to enhance students' satisfaction, continued intentions thereby strengthening their academic performance, using e-learning system. This research contributes to the literature by empirically examining a research model, revealing students' e-learning behaviour and academic performance at HEIs.

Keywords: e-learning; electronic learning; quality; satisfaction; continued intentions; academic performance; higher education; higher education institutions; HEIs.

Reference to this paper should be made as follows: Shah, T.R. and Chhaniwal, P. (2024) 'Modelling e-learning quality, self-efficacy and students' behaviour', *Int. J. Learning Technology*, Vol. 19, No. 1, pp.58–84.

Biographical notes: Tejas R. Shah holds a PhD in Management and MBA in Marketing. He is working as an Assistant Professor at the Institute of Management, Nirma University. He has more than 15 years of teaching experience in management. He has published many research papers in reputed national and international journals. His teaching and research areas include digital marketing, services marketing and consumer behaviour.

Poonam Chhaniwal holds a PhD in Management and MBA in Human Resource Management. She is working as an Assistant Professor at the Institute of Management, Nirma University. She holds experience of more than 15 years of teaching experience in human resource management domain. Her areas of teaching and research interest are talent management, diversity and inclusion at workplace and performance management.

1 Introduction

Universities of developing countries have started adopting e-learning systems aided by the developments in telecommunications and computer technologies, impelling new methods of facilitating services in the educational sector (Gombachika and Khangamwa, 2013; Lai, 2008; Mosa et al., 2016). COVID-19 pandemic has compelled higher educational institutions to shift from traditional classroom to modern remote and online teaching-learning process (Mohammed, 2022). Today, higher educational institutions have started using modern technologies to facilitate efficient and effective service delivery (Blut et al., 2016). Modern technologies have replaced conventional physical interfaces which have made service encounters precise, convenient and quick. Educational Institutes have started using information and communication technology infrastructure for teaching without direct personal contact with students (Majanja, 2020). Technology-based innovation in services is growing owing to its speed, capacity, connectivity, functionality and ease of use. Cunningham et al. (2009) mentioned that modern technologies pave the way to deliver services at a low cost. However, it is a challenging task to encourage students to use new technologies during service interactions while additionally the task of technology replacing teachers is also riddled with complications (Curran and Meuter, 2005).

Today, there is a growing trend of integrating internet technologies in the teaching-learning process (Ferran et al., 2007; Cheng, 2013). Organisations have also started investing their resources for providing knowledge by evolving online learning programs. E-learning uses computer technology to deliver e-learning services with greater flexibility and mobility (Learnframe, 2002; Ehlers, 2009). Pollack (2007) described e-learning as distance education that uses new technologies to increase collaborative learning among various stakeholders. E-learning system uses technologies to deliver services that allow users to access e-learning materials and courses (Sørebø et al., 2009). These platforms remove restrictions of traditional learning and are largely becoming a substitute to older learning process (Lee et al., 2009; Ho et al., 2010).

Assessment of quality of electronic learning quality is vital for its acceptance and providing value to the society (Mohammed, 2022). Past research related to e-learning quality is centred on SERVQUAL dimensions (Raspopovic et al., 2014). Literature suggests that e-learning quality is multidisciplinary in nature and therefore should be examined from various aspects of service environment (Yen and Gwinner, 2003; Liaw, 2008; Chopra et al., 2019). Alsabawy et al. (2013) stressed studying association between e-learning quality and user's behaviour in terms of satisfaction and continued usage intention. Few studies in the past have stressed the need to inspect the influence of information quality, system quality and service quality of e-learning on learners' perception in terms of satisfaction and continued intention (Raspopovic et al., 2014; Pham et al., 2019; Chopra et al., 2019). Teachers' role undergone a transformation, in e-learning system, from a passive communicator to active enabler and collaborator (Katsaris and Vidakis, 2021). Thus, it is important to study how shifting role of instructors and their teaching quality affects students' learning, results and experience (Cheng, 2014; Kalogiannakis and Papadakis, 2019). Users' self-efficacy and competencies affect their interactions with online learning system (Moos and Azevedo, 2009). Learner's self-efficacy towards e-learning system plays important role in bringing desired learning outcomes and behaviour in e-learning system (Hoffman and Spatariu,

2008; Tsai et al., 2011). This paper will bridge the gap by studying the interrelationships among e-learning quality including instructor quality and students' self-efficacy, satisfaction, continued intention and academic performance.

2 Review of literature

2.1 E-learning quality

Learning quality is a vital phenomenon (Lee and Lee, 2008). Literature reveals that measurement of e-learning quality is complex and multi-dimensional. Few researches argued that e-learning quality should be evaluated based on traditional learning quality criteria, while others opined that conventional learning quality measures were not suitable, as e-learning present's different mechanisms to deliver educational service (Uppal et al., 2017). Yet, some researchers explained that though both traditional and e-learning criteria can be applicable, some common doctrines of quality measures need to be tested to both conventional education and electronic learning. E-learning quality leads to effectiveness and attainment in educational services (Chopra et al., 2019). Agariya and Singh (2012) defined e-learning quality as "the divergence between students' experience with respect to the services subject material including program design, e-learning functions, etc. existing by a specific institute and their prospects about services".

Past studies have explored a number of e-learning quality frameworks and models (Farid et al., 2018). Table 1 summarises the e-learning quality variables explored in literature.

The literature on e-learning quality is diverse and contextual (Roca et al., 2006; Robertson et al., 2016; Cheng, 2013; Raspopovic et al., 2014; Chopra et al., 2019; Shah et al., 2021). It must be noted that e-learning quality is multidisciplinary and therefore should be widespread (Lwoga, 2014; Cheng, 2013; Uppal et al., 2017). Information system concepts and models are prevalent among scholars to validate e-learning quality (Roca et al., 2006; Raspopovic et al., 2014; Chopra et al., 2019). Delone and McLean (1992) developed the original information system achievement framework that includes six factors for measuring e-learning systems, i.e., 'system and data quality, usage, end user's gratification, personal and organisational impacts'. Later, Delone and McLean (2002), Delone and McLean (2003) and Delone and McLean (2004) included 'service quality' as another important measure as well as behavioural intent (as an alternative for usage) (Delone and McLean, 2004). Majority of past studies adapted the Delone and McLean (2003) and Delone and McLean (2004) model and considered information, system and service quality variables to measure quality of e-learning.

Information quality: Information quality denotes 'users' assessment of information quality offered through website' (McKinney et al., 2002). Cheng (2013) mentioned that information quality is related to value delivered to customers through information on web. Chopra et al. (2019) referred to information quality as course content quality and instructional material in the practice of written, audio or video formats. It has also been signified in literature related to e-learning (Roca et al., 2006; Uppal et al., 2017; Chopra et al., 2019). Lwoga (2014) presented information quality as the course content quality provided through course management system. Previous investigators elaborated that information quality includes correctness, usefulness, inclusiveness, up-to-date, proficient, applicable and promptness of information (Roca et al., 2006; Lee et al., 2009; Sun et al.,

2008; Lee-Post, 2009; Islam, 2011; Ho et al., 2010; Lwoga, 2014; Rui-Hsin and Lin, 2018). Information quality encompasses course content quality (Uppal et al., 2017) and course design (Cheng, 2012) that includes simplicity, presentation, timeliness, appropriateness, current, etc. (Cheng, 2013). Information quality provides better learners' experience (Choi et al., 2007).

Table 1 E-learning quality

Authors	*E-learning variables*
Ronald and Jamie (2000)	'Institutional support', 'subject development', 'teaching and learning', 'subject structure', 'scholar support', 'facilitator support' and 'evaluation and assessment'
Ehlers (2004)	'Instructor support', 'association', 'technology', 'costs-benefits', 'data authenticity of provider and subjects', 'subject construction and presence' and 'didactics'
WebCT (2006)	'Subject design', 'interface and association', 'assessment and evaluation', 'significant technology use', and 'student support'
Pawlowski (2006)	'Setting requirements', 'overall situations', 'design of content and process', 'content development', 'launching system', 'execution and evaluation'
Sun et al. (2008)	'Learner', 'instructor', 'course', 'technology', 'design' and 'environment'
MEST (2008)	'Instructive planning', 'instruction', 'human resources', 'physical infrastructure', 'management and administration' and 'academic results'
Shee and Wang (2008)	'Student interface', 'education community', 'system contents' and 'personalisation'
Chen (2009)	'Personnel', 'course', 'system', 'content', 'navigation', 'instructional design' and 'instructional media'
Ellis et al. (2009)	'E-teaching', 'design', 'workload' and 'interactivity'
Masoumi and Lindström (2012)	'Institutional factor', 'instructional design factor', 'assessment factor', 'instructor support', 'learner support', 'pedagogical factor' and 'technical factor'
Agariay and Singh (2012)	'Subject content', 'design structure', 'transparency in evaluation', 'technical knowledge', 'engagement', 'collaboration', 'industry acceptance' and 'value addition'
Farid et al. (2018)	'Service', 'system' and 'charisma'

System quality: System quality is related with functionality and content handling of system (Delone and Maclean, 1992; Lin, 2007; Chen, 2010). System quality denotes 'to the superiority of the utility of an information platform' (Cheng, 2012, 2013). Chopra et al. (2019) conceptualised "e-learning system quality as the superiority of the website or an electronic teaching portal through which users can comfortably access the subjects or teaching resources without any complexity". Literature has shown system quality as a significant attribute of complete e-learning quality (Raspopovic et al., 2014; Chopra et al., 2019). System quality includes promptness, flexibility, consistency, uniformity, navigation, design, responsiveness; security, privacy, etc. (Lin, 2007; Lee-Post, 2009; Lwoga, 2014; Raspopovic et al., 2014). System quality can create an atmosphere where users can access information and related materials and enhance overall user experience (Cheng, 2012). Several researchers have stated various benefits of system quality like purposeful, flexibility; user-friendly; accessibility; collaboration, well-organised,

personalisation, security and privacy (Ozkan and Kozeler, 2009; Liu et al., 2010; Ramayah and Lee, 2012; Rui-Hsin and Lin, 2018). Choi et al. (2007) mentioned that well-designed web-based learning systems result in better instructor-student interaction and overall experience.

Service quality: service quality is central in service marketing literature. The literature confirmed that service quality is abstract and ambiguous due to its intangibility, inseparability and variability (Perez et al., 2007). There is consensus amongst scholars regarding the diverse and contextual nature of service-quality dimensions. 'Service quality is the customers' general assessment of quality of information system'. Service quality is an important aspect in e-learning contexts (Chopra et al., 2019) that measures the functionality of information systems (Cheng, 2013). Service quality is characterised as responsiveness, accessibility, flexibility, accuracy, user friendly, ease-of-use, speed, interactivity, navigation, aesthetic, empathy; individualisation, etc. (Robertson et al., 2016; Farid et al., 2018; Pham et al., 2019). Service quality is a crucial dimension to enhance e-learning quality (Lee-Post, 2009; Cheng, 2012; Lwoga, 2014; Chopra et al., 2019). Cheng (2012) explained that e-learning quality enhances students' learning experience and enjoyment. Service quality enhances learners' acceptance electronic learning mechanisms. Lwoga (2014) mentioned that service quality helps to improve interactions with learners thereby enhancing their e-learning experience.

2.2 ISSM model

Delone and McLean (2003) and Delone and McLean (2004) information system success model (ISSM) has been used by several researchers in e-learning setting. Table 2 summarises the ISSM dimensions discovered in past studies.

Table 2 ISSM dimensions

Authors	*ISSM dimensions*
Roca et al. (2006)	Information quality ('relevant', 'easy-to-understand', 'clarity', 'format', 'good content', 'up-to-date', 'completeness', 'reliability', 'timeliness'), system quality ('easy steps', 'logical sequence', 'predicted result', 'clarity', 'predictable screen changes', 'quick response') and service quality ('interface', 'visually appealing', 'right solution', 'promptness', 'individual attention', 'communication', 'convenience')
Lee-Post (2009)	Information quality ('clarity', 'presentation', 'length', 'beneficial', 'organised', 'up-to-date', 'comprehensive'), system quality ('pace', 'responsiveness', 'accessible', 'stable', 'security', 'comfortable to use') and service quality ('available', 'responsive', 'knowledge', 'fair', 'prompt')
Ho et al. (2010)	Information quality ('appropriateness', 'updateness', 'usefulness', 'accuracy', 'completeness', and 'relevance'), system quality ('friendliness', 'flawlessness', 'efficiency' and 'adaptability') and service quality ('staff reliability', 'responsibility', 'empathy', 'learners' confidence in online staff')
Cheng (2012)	information quality ('sufficient content', 'updated', 'need-based content', 'appropriate level of difficulty', 'flexible schedule', 'individualised leaning management') system quality ('functionality', 'interactivity', 'response', 'user-interface') and service quality ('help desk support service', 'administrative service', 'satisfactory')

Table 2 ISSM dimensions (continued)

Authors	*ISSM dimensions*
Cheng (2013)	Information quality ('relevant', 'format', 'good content', 'up-to-date', 'reliable', 'timeliness'), system quality ('logical sequence', 'predicted results', 'organisation', 'natural and predictable screen changes', 'respond quickly') and service quality ('excellent overall quality', 'service meet with expectations', 'competitive')
Cheng (2014)	Information quality ('updated and sufficient', 'content as per need', 'appropriate level of difficulty', 'flexible schedule'), system quality ('self-control', 'format', 'interactivity', 'response') and service quality ('help desk support service', 'administrative service', 'satisfactory')
Lwoga (2014)	Information quality ('knowledge and information', 'satisfactory', 'ease to share ideas', 'availability', 'readable', 'clear and well formatted'), system quality ('tests and assignments', 'interactiveness', 'consistent response time', 'reasonable response time', 'user-friendly layout', 'structured layout') and service quality ('availability of assistant', 'respond promptly', 'satisfactory overall service')
Raspopovic et al. (2014)	Information quality ('organised', 'consistency', 'relevance', 'clarity', 'systematic', 'beneficial', 'personalised', 'relevant'), system quality ('flexibility', 'personalisation', 'user-friendly', 'stable', 'secure', 'responsive', 'reliable') and service quality ('interest', 'available', 'prompt', 'helpful', 'feedback for teachers', 'feedback from instructors', 'displayed knowledge')
Uppal et al. (2017)	data superiority ('presentation', 'framework', 'user friendliness', 'language', 'transfer modes'), system quality ('interface design', 'switch over cum navigation', 'appeal', 'ease-of-use') and service quality ('reliability', 'assurance', 'tangibility', 'empathy', 'responsiveness')
Chopra et al. (2019)	Information quality ('easy-to-understand', 'usable form', 'relevant', 'accessible', 'complete', 'market trends'), system quality ('ease-to-use', 'easy learning', 'features and functions', 'adaptable', 'integration' and 'consistent') and service quality ('navigation', 'well-organised', 'reliable')

2.3 Instructor quality

Instructor quality implies "the degree to which learners perceive that the instructor's attitude that relates to the instructor's response timeliness, teaching style, and help toward learners via the e-learning system" (Cheng, 2014). Teachers' acceptance of e-learning system is critical as it involves transforming their role from passive disseminator to active facilitator and collaborator (Wieser and Seeler, 2018; Papadakis, 2018). Teachers play a significant part in enhancing students' e-learning and their e-learning behaviour (Tsourela et al., 2014; Watanabe et al., 2017; Cheng, 2014). Chang (2012) emphasised that instructor quality should be considered as one of the important dimensions of overall e-learning quality. Instructor quality in terms of response time, interactive teaching style, assistance, feedback, etc. are important for improved students' e-learning (Sun et al., 2008; Lee et al., 2009).

2.4 Self-efficacy

Online education is categorised by augmented focus on user's profiles, reactions and their varying needs. Users' needs are marked by differences in regional, language and local

culture and online education could be defined as utilisation of information technology based learning. Learner's satisfaction and recognition of online education and technology supported user interfaces help build learner's encouraging perception towards online learning. Bandura (1986) presented that learners with high self-efficacy were seen to better manage, execute and resolve problems pertaining to learning activities successfully. Self-efficacy towards online learning could be defined as an explicit form of efficacy, pertaining to candidate's assessment of their competencies and confidence to utilise online learning systems (Bandura, 1997). Marakas et al. (1998) presented self-efficacy to a person's belief on the ability to achieve a specific behaviour. Agarwal et al. (2000) mentioned that technology self-efficacy leads to ease-of-use towards new systems. Girasoli and Hannafin (2008) also presented learners with analytical progressions to be impacted by self-efficacy. Pajares and Schunk (2001) presented self-efficacy to be measured as domain specific or work specific for higher validity and predictive significance.

Academic self-efficacy as defined by Girasoli and Hannafin (2008) refers to 'learner's beliefs for academic learning'. Compeau and Higgins (1995) characterised computer self-efficacy as 'candidates' apparent faith in his/her capabilities to utilise computer'. Yukselturk and Bulut (2007) presented self-efficacy as 'candidates' belief and faith in their competencies to lead a course in online medium'. Studies conducted by Moos and Azevedo (2009) presented a rich literature review on the relationships between computer enabled learning context and computer self-efficacy. Peng et al. (2006) bifurcated internet self-efficacy to as general and communicative that affects learning experience. Chiou and Wan (2007) explored the positive association between internet self-efficacy and user experience. The literature confirms the vital role of self-efficacy in generating desired learning outcomes and behaviour (Karsten and Roberta, 1998; Hoffman and Spatariu, 2008) especially in e-learning contexts (Tsai et al., 2011).

2.5 Satisfaction

Oliver (1999, p.34) indicated "satisfaction is an enjoyable complementary activity that a customer feels when he or she is using the service or product". Customer satisfaction denotes 'customers affective retort to the experience related to a specific matter with an organisation' [Boulding et al., (1993), p.8]. With the development and usage of modern technologies in various services, authors have defined satisfaction in an online setting. Anderson and Srinivasan (2003, p.125) elucidated online satisfaction as "the purchaser's overall evaluation on the superiority of services or merchandises presented in the online marketplace". Wang (2003, p.77) defined electronic learner satisfaction as, 'a collective emotional retort of variable power that follows e-learning activities'. Ho et al. (2010) conceptualised 'e-satisfaction as the degree to which the online learners are content with the electronic teaching system, their teaching initiatives, as well as the strategies they take to learn or react online'. Consumer satisfaction has been customised and contextualised in e-learning service environments as per research carried out in this domain (Park and Gretzel, 2007; Chiu et al., 2007; Ding et al., 2011).

Higher education institutions (HEIs) have considered e-learners' satisfaction as a vital aspect to evaluate success (Kang et al., 2018). Research papers in e-learning confirm satisfaction as an important e-learning outcome (Tong, 2009; Baturay, 2010). Chopra et al. (2019) explained satisfaction as a key to evaluate e-learning effectiveness. Kuo et al. (2014) revealed that learners' satisfaction shows success of e-learning systems. Past

studies have used user satisfaction differently as e-learning outcomes (Ding et al., 2011; Islam et al., 2018; Kang et al., 2018). Lee and Lee (2008) explored 'experience', 'flexible time', 'place', 'better than off-line course' and 'overall satisfaction' to measure e-learning satisfaction for undergraduate and graduate students. Sun et al. (2008) measured students' satisfaction on the basis of 'satisfied', 'glad', 'wise', 'need fulfilment', 'many courses' and 'ease' at university level. Lee-Post (2009) assessed e-learning based on 'overall gratification', 'fun' and 'word-of-mouth' for undergraduate students. Hsieh and Cho (2011) evaluated e-learning satisfaction in terms of 'self-control', 'wise decision' and 'sense of satisfaction' dimensions. Cheng (2013) conducted a study based on 'performance', 'pleased' and 'wise decision' variables to evaluate e-learning satisfaction. Cheng (2014) did a research on nurses to measure e-learning satisfaction based on 'content', 'pleased', 'happy' and 'overall satisfaction' criteria. Kang et al. (2018) used 'usefulness', 'overall gratification' and 'word-of-mouth' variables to measure e-learning satisfaction for physicians.

2.6 Continued intention

Bhattacherjee (2001, p.211) defined continued intention as "the sustained use of an information technology by individual users over the long period" in information system contexts. Bhattacherjee et al. (2008, p.24) referred continued intention as "the individual's attention to continued use of information system". Cheng (2013) stated purpose to utilise electronic learning mechanism as "the degree to which a candidate is eager to utilize electronic teaching systems in the upcoming future and to endorse e-learning mechanism to others in the future".

Many researchers used continued intention to assess students' tendency of future e-learning behaviour. Roca et al. (2006) explored 'regular use', 'frequent use' and 'recommendation' as important dimensions of students' e-learning continuance intention. Hsieh and Cho (2011) conducted an e-learning study in higher education and explored 'continuous use', 'more usage', and 'increase in use' variables of behavioural intention. Cheng (2012) used 'regular use', 'frequent use' and 'recommendation' to measure students' continued intention towards e-learning for employees of high-tech companies. Cheng found 'regular use', 'frequent use' and 'recommendation' as important aspects of students' continued intention at graduate and undergraduate levels. According to Cheng (2014), 'continued use', 'regular use', 'frequent use' and 'alternative to traditional learning' are important to measure continued intention of nursing students. Lwoga (2014) conducted research on e-learning for undergraduate students and found 'continuous use', 'frequent use' and 'regular use' variables to measure continued intention. Rui-Hsin and Lin (2018) found 'intent to use' and 'predict to use' as important criteria to assess e-learning continued intention for frontline police officers.

2.7 Academic performance

Consumer behaviour framework presented that contentment is measured by way of end users response in context of completion and end users judgment of the product or service. Contentment also includes accomplishment of one's performance in the context of a set standard. Gratification from e-learning and its assessment has its roots in the consumer conduct theory. Studies undertaken by Bailey and Pearson (1983) presented an

encouraging association between user information system contentment and improved performance vis-a-vis of discontented users.

E-learning system can regularly update the information that helps to perform better (Lee et al., 2009; Cheng; 2013). A student centred e-learning system delivers students with better opportunity to improve academic performance (Lee et al., 2009). E-learning systems provide better learner's experience and enjoyment thereby leads to better learning performance (Choi et al., 2007; Liu et al., 2010). Waight and Stewart (2005) stressed the importance of measuring learner's academic performance as on outcome of e-learning success. Lee and Lee (2008) explored the positive relationship between learner's evaluation of learning quality and their achievement. Lee and Lee (2008) measured academic performance as students' learning outcome in e-learning environments. They assessed learner's academic performance in terms of 'good grade', 'better grade than off-line learning', 'and anticipation of good grade'. Ho et al. (2010) also measured learning outcome as 'goal achievement' and 'skill development'.

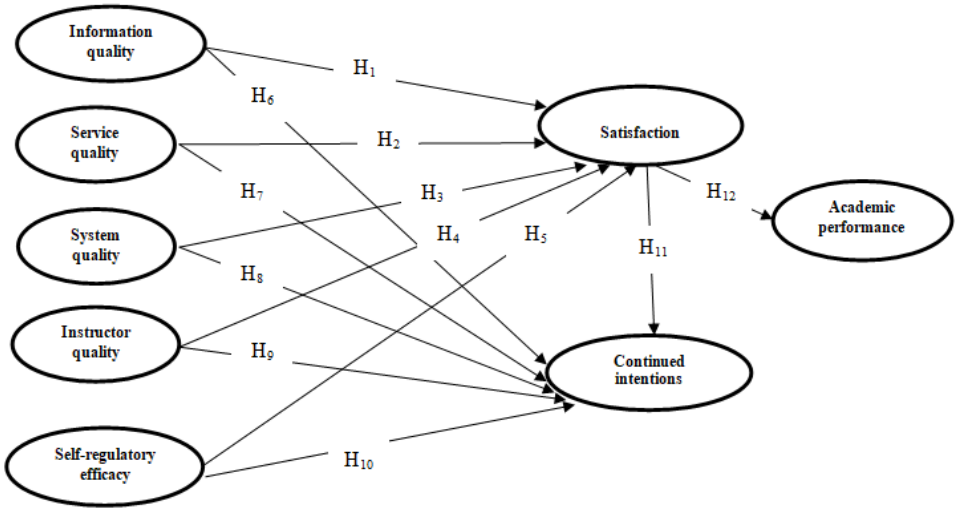
3 Objectives

The objective of this research is to explore and investigate the effect of e-learning quality, instructor quality, self-efficacy on students' satisfaction and continued intentions. The study also aims to examine the effect of students' satisfaction on academic performance.

4 Conceptual framework and hypothesis

Quality of e-learning system is critical bringing desired students' learning outcomes as well as shifting behaviour in terms of satisfaction and continued usage intention. Delone and McLean's (2003) and Delone and McLean's (2004) ISSM model has been widely used in e-learning context to assess e-learning quality that defined information, system and service quality as critical dimensions to measure (Chopra et al., 2019; Raspopovic et al., 2014). Quality of information delivered during e-learning system affects students' interaction and overall behaviour (Ramayah and Lee, 2012; Roca et al., 2006). System quality is related to creating atmosphere that makes learner accessing and using the system without any complexities (Cheng, 2012). System quality influences learners' satisfaction and continued intention to use the same e-learning system (Lee and Lee, 2008). Service quality affects students' behaviour while interacting with e-learning system (Lwoga, 2014). The literature supports the positive effects of e-learning service quality on students' satisfaction and continued intention (Ho et al., 2010; Ramayah and Lee, 2012). E-learning system has transformed instructors' role in terms of pedagogy, teaching style, support and response defines their teaching quality that affects students' learning results and experience (Cheng, 2014; Kalogiannakis and Papadakis, 2019). Learners' self-efficacy are vital for their overall experience while interacting with an e-learning system in turn it affects their behaviour and learning (Hoffman and Spatariu, 2008; Tsai et al., 2011). Students' acceptance of e-learning in long-term depends upon their learning results and outcomes (Lee and Lee, 2008).

Figure 1 Conceptual model



4.1 Information quality, satisfaction and continued intention

Lee et al. (2007) defined information quality as "the degree to which users perceive the information to be relevant, timely, accurate and complete". Information quality implies course information delivered through e-learning system (Lwoga, 2014). Information quality conveys the value of information available on the website (McKinney et al., 2002). Information quality positively influences satisfaction in e-learning contexts (Hsieh and Cho, 2011; Ramayah and Lee, 2012) and continued intention (Raspopovic et al., 2014). Cheng (2013) found that information quality leads to improving students' contentment and continued intention in e-learning settings. E-learners' positive evaluation of information system quality results into satisfaction (Ho et al., 2010; Cheng, 2014; Chopra et al., 2019) and continued intention (Roca et al., 2006; Lee et al., 2009; Cheng, 2014). Waight and Stewart (2005) stated that content quality helps to improve learning and satisfaction. Hsieh and Cho (2011) found that information quality leads to improving learner's satisfaction. Lee and Lee (2008) mentioned that satisfaction is the output of users' interaction with quality of information. Lwoga (2014) explored association between information quality and e-learners' satisfaction.

H1a E-learning information quality creates a significant positive effect on e-learners' satisfaction.

H1b E-learning information quality creates a significant positive effect on e-learners' continued intention.

4.2 System quality, satisfaction and continued intention

System quality denotes 'the superiority of the functionality of an IS itself' (DeLone and McLean, 1992; Lee and Lee, 2008). Researchers have confirmed the favourable association between system quality and e-learning contentment (Ho et al., 2010; Ramayah and Lee, 2012; Cheng, 2013; Raspopovic et al., 2014; Lwoga, 2014; Chopra

et al., 2019) and behavioural intention (Ramayah and Lee, 2012; Cheng, 2013; Raspopovic et al., 2014). The system quality improves students' contentment and overall learning experience (Cheng, 2012; Lwoga, 2014). Wong (2012) also explained that quality e-learning systems can improve students' interaction and learning. The e-learning platform with well-designed syllabus, simple and easy-to-understand presentation makes students more involved (Cheng, 2012). Islam (2011) mentioned that system quality is a useful tool in students' continued intent to use e-learning platforms. Thus, information system quality helps to increase students' participation that improves overall learning (Ranjbarfard and Heidari Sureshjani, 2018). Rui-Hsin and Lin (2018) found that system quality affects learners' perception and satisfaction. The literature confirms association between system quality and learners' satisfaction as well as continued intention (Lee and Lee, 2008; Hsieh and Cho, 2011; Lwoga, 2014; Chopra et al., 2019).

H2a E-learning system quality creates a significant positive effect on e-learners' satisfaction.

H2b E-learning system quality creates a significant positive effect on e-learners' continued intention

4.3 Service quality, satisfaction and continued intention

Service quality is 'the degree of the quality of information system services from user perspective' (DeLone and McLean, 1992; Cheng, 2012). The association between e-service quality and satisfaction is well recognised in the literature (Ranaweera et al., 2008; Liu et al., 2010). The linkage between e-learning service quality and satisfaction has been well-established in the literature (Ramayah and Lee, 2012; Cheng, 2013; Lwoga, 2014; Raspopovic et al., 2014; Chopra et al., 2019). Cheng (2012) explored the positive association between service quality learners' e-learning acceptance. Universities have started putting emphasis on assessing e-learning service quality from the learners' standpoint (Pham et al., 2019). Different service quality attributes lead to satisfaction (Ho et al., 2010; Raspopoivc et al., 2014). E-learning service quality helps to improve learners' active participation (Wong, 2012; Lwoga, 2014; Rui-Hsin and Lin, 2018). Past literature reveals the influence of e-learning service quality on continued intention (Yen and Gwinner, 2003; Lee, 2010; Ramayah and Lee, 2012; Raspopovic et al., 2014).

H3a E-learning service quality creates a significant positive effect on e-learners' satisfaction.

H3b E-learning service quality creates a significant positive effect on e-learners' continued intention.

4.4 Instructor quality, satisfaction and continued intention

Tutor quality drives-learner's favourable attitude (Ozkan and Koseler, 2009), indicating that the tutor is central for students' behaviour in the electronic teaching process. Primarily, students' seeming contentment fore-learning is effected by teacher's quality that pertains to teacher's reply timelines, instruction style and assistance towards students (Choi et al., 2007; Lee et al., 2009).

H4a Instructor quality creates a significant positive effect on e-learner's satisfaction.

H4b Instructor quality creates a significant positive effect on e-learner's continued intention.

4.5 Self-efficacy, satisfaction and continued intention

McVay (2000) stressed the strong connections and interactions of instructor-learner in e-learning. Popper (1972) recommended that learners should make the most of those deliberations which may offer occasions of enriched discourse and considerate questions as a tool to engage both peers and tutors. Inquiring and putting queries is a way to go deeper into the course. In addition, when learning online, learners should leverage opportunities to work with other students learning online, by way of encouragement, feedback and motivation.

H5a Self-efficacy creates a significant positive effect on e-learner's satisfaction.

H5b Self-efficacy creates a significant positive effect on e-learner's continued intention.

4.6 Satisfaction and continued intention

Oliver (1993) explained that customer satisfaction leads to behavioural intention of repurchase. Yen and Gwinner (2003) found a positive link between e-satisfaction and continued intentions. Satisfaction from website is important to develop relationships with customers and generate repeated continued intention (Ranaweera et al., 2008). Roca et al. (2006) found that students' e-learning satisfaction positively affects continuance intention. Cheng (2013) found the positive relationships among users' e-satisfaction and continuous intention. Bhattacherjee and Barfar (2011) found the satisfaction develops long-term relationships with customers and generate repeated continued intention. Previous studies have confirmed the positive influence of satisfaction on continued intention in e-learning contexts (Cheng, 2014; Lwoga, 2014).

H6 E-learning satisfaction create as significant effect on e-learners' behavioural intention

4.7 Satisfaction and academic performance

Consumer behaviour theory suggests that user satisfaction from information system results into expected performance (Au et al., 2002). Lee and Lee (2008) concluded that students' perception and satisfaction towards learning bring positive achievements. In e-learning context, students' behaviour determines their academic performance. Student satisfaction from e-learning leads to improve their performance in terms of goal achievement and skill development (Lee and Lee, 2008; Ho et al., 2010).

H7 E-learners' satisfaction from e-learning will be positively related to the academic performance of e-learning.

5 Research methodology

5.1 Sampling procedure and sample profile

Data was collected using an online survey. A convenience sampling technique was used for data collection from Ahmedabad, Vadodara, Surat and Rajkot during November-December 2021. Respondents were randomly contacted while they were attending online sessions and were requested to assist in the research. Scattered scheduling was applied to contact the respondents from different universities to lessen sampling bias. For the outcomes to be generalisable, sample sizes of 832 replies were secured from respondents from diverse academic background. Descriptive features of the operational responses are available in the concise text. Among the 832 operational responses, 454(54.57%) were male and 378(45.43%) were female. The distributions of respondents as per the cities are as follows: Ahmedabad 214 (25.72%), Vadodara 207(24.88%), Surat 206(24.76%) and Rajkot 205(24.64%).

Table 3 Sample characteristics ($N = 832$)

	Frequency	*Percent*
Gender		
Male	454	54.57
Female	378	45.43
City		
Ahmedabad	214	25.72
Vadodara	207	24.88
Surat	206	24.76
Rajkot	205	24.64

5.2 Measures

The questionnaire was pre-tested to understand if the scale items were appropriate. The pre-test did not reveal any major concern and minor language corrections were made. The first section comprised statements regarding respondents' age, education, gender, and household income levels. The second section consisted of the dimensions rated on seven-point Likert-type scale, from 1 = strongly disagree to 7 = strongly agree. Respondents were requested to specify their agreement/disagreement with the statements. The validated scale items were used to operationalise each construct, which was adapted from earlier research (see Table 4).

5.3 Sample adequacy and data refinement

Out of the total 864 filled online responses, only 832 were used for analysis since 22 were partially filled and the remaining ten were considered outliers by the Mahalanobis (D^2) test. The sample size adequacy for factor analysis was tested using the KMO sampling adequacy test (0.879) along with Bartlett's Test of Sphericity (significance of $p < 0.000$) proved sample size adequacy and suitability for further analysis. Hair et al. (2014) endorses that values for factor loadings higher than 0.63 are acceptable; accordingly, items were considered for further analysis. Exploratory factor analysis of all

the measurement items extracted eight factors explaining 74.67% of the total variance, and the first factor explained only 31% of the total variance, henceforth, CMB was not an issue in the current research (Podsakoff et al., 2003).

Table 4 Constructs, indicators and descriptive statistics

Adaptation details	*Constructs and indicators*	*Mean*	*SD*	*Loading*
Adapted from Roca et al. (2006), Raspopovic et al. (2014) and Chopra et al. (2019)	Information quality (α = 0.851; CR = 0.711; AVE = 0.612; MSV = 3.021; ASV = 0.216)			
	E-learning platform can provide content which is easy-to-understand and in proper format.	3.98	0.750	0.801
	E-learning platform can provide up-to-date and complete learning content.	4.12	0.657	0.867
	E-learning platform can provide relevant information as per my individual requirements.	4.57	0.877	0.791
	E-learning platform offers flexible schedule to provide learning content.	4.92	0.990	0.712
	E-learning platform can provide well-organised, clear and useful learning content.	3.90	1.102	0.701
Adapted from Roca et al. (2006), Cheng (2012), Cheng (2013) and Chopra et al. (2019)	System quality (α = 0.839; CR = 0.732; AVE = 0.628; MSV = 3.110; ASV = 0.204)			
	E-learning platform facilitates interactions among instructors and learners and among learners.	4.56	1.119	0.805
	E-learning platform is consistent.	4.84	1.156	0.886
	E-learning platform is user-friendly, predictable and follows a logical sequence.	5.12	0.987	0.712
	Electronic-learning system can present learning content in multimedia format.	4.36	1.143	0.820
	E-learning platform is all-inclusive, integrated and adaptable.	4.95	1.256	0.790
	Electronic-learning platform allows to control over the pace of individual learning	4.46	0.880	0.688
Adapted from Roca et al. (2006), Uppal et al. (2017) and Chopra et al. (2019)	Service quality (α = 0.878; CR = 0.820; AVE = 0.665; MSV = 3.344; ASV = 0.251)			
	E-learning platform provides modern interface and visually appealing content.	4.91	0.987	0.789
	E-learning platform provides prompt response with right solution.	4.80	0.955	0.711
	E-learning platform is convenient, easy-to-use and has proper navigation.	4.58	1.078	0.773

Notes: SD = Standard deviation; α = Cronbach alpha; CR = Merged reliability; AVE = Average variance extracted; MSV = Maximum shared variance; ASV = Average shared variance.

Table 4 Constructs, indicators and descriptive statistics (continued)

Adaptation details	*Constructs and indicators*	*Mean*	*SD*	*Loading*
Adapted from Roca et al. (2006), Uppal et al. (2017) and Chopra et al. (2019)	E-learning platform gives individual attention and communicate as per individual needs	4.96	0.899	0.755
	E-learning platform is reliable and delivers expected results.	5.10	0.865	0.702
Adapted from Cheng (2012)	Instructor quality (α = 0.892; CR = 0.752; AVE = 0.629; MSV = 3.133; ASV = 0.237)			
	The instructor promptly and efficiently responds to leaners' questions via e-learning platform.	4.68	1.054	0.822
	The instructor is interactive with learners and encourages participation via e-learning platform.	4.66	1.098	0.745
	The instructor is knowledgeable and delivers good quality lecture via e-learning platform.	3.98	0.761	0.760
	The instructor is well prepared and frequently updates lecture notes via e-learning platform.	4.17	0.922	0.705
	Above all, the teacher's attitude is favourable that keeps students' long-term interest in mind.	3.92	1.070	0.739
Adapted from Lee and Lee (2008)	Self-efficacy (α = 0.884; CR = 0.712; AVE = 0.618; MSV = 3.123; ASV = 0.215)			
	I feel self-confident in utilising the internet to search relevant data for e-learning.	4.88	1.062	0.834
	I feel competent downloading and using e-learning software.	4.73	1.078	0.769
	I am comfortable in using in using online discussion tools and collaborate with others.	4.26	0.987	0.775
	I have relevant skills and knowledge of using latest computer/laptop/mobile hardware and software for e-learning.	4.07	1.023	0.717
	I feel competent following required steps on e-learning platform.	4.00	1.065	0.748
Adapted from Cheng (2013)	Satisfaction (α = 0.908; CR = 0.825; AVE = 0.646; MSV = 3.314; ASV = 0.253)			
	I am satisfied with the performance of the e-learning service.	4.89	0.949	0.891
	I am content with the experience of utilising the electronic-learning service.	4.67	0.966	0.835

Notes: SD = Standard deviation; α = Cronbach alpha; CR = Merged reliability; AVE = Average variance extracted; MSV = Maximum shared variance; ASV = Average shared variance.

Table 4 Constructs, indicators and descriptive statistics (continued)

Adaptation details	*Constructs and indicators*	*Mean*	*SD*	*Loading*
Adapted from Cheng (2013)	My choice to use the e-learning service was an intelligent one.	4.72	0.897	0.827
Adapted from Cheng (2012, 2013)	Continued intentions (α = 0.854; CR = 0.791; AVE = 0.656; MSV = 3.168; ASV = 0.236)			
	I will regularly utilise the electronic-learning platform in the future.	4.02	0.889	0.873
	I will utilise the electronic-learning platform frequently in the near future.	4.34	1.137	0.803
	I will strongly approve others to use the electronic-learning platform.	3.98	1.124	0.898
Adapted from Lee and Lee (2008)	Academic performance (α = 0.873; CR = 0.753; AVE = 0.636; MSV = 3.148; ASV = 0.236)			
	The e-learning platform improves my grade on the subject.	4.70	0.889	0.795
	I expect good grade in e-learning course.	4.78	1.024	0.887
	The electronic-learning course has secured a good grade compared to offline course.	4.69	1.120	0.766

Notes: SD = Standard deviation; α = Cronbach alpha; CR = Merged reliability; AVE = Average variance extracted; MSV = Maximum shared variance; ASV = Average shared variance.

Figure 2 Measurement framework

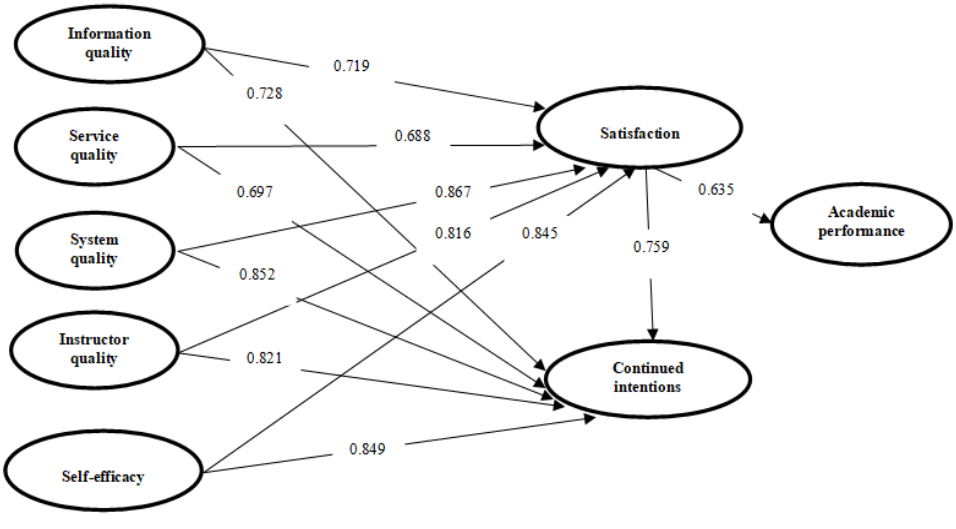


Table 5 Associations between the constructs

Construct	*Information quality*	*System quality*	*Service quality*	*Instructor quality*	*Learners' self-efficacy*	*Satisfaction*	*Continued Intention*	*Academic performance*
Information quality	*0.782*							
System quality	0.467	*0.792*						
	(0.389)							
Service quality	0.532	0.456	*0.815*					
	(0.310)	(0.231)						
Instructor quality	0.647	0.563	0.483	*0.793*				
	(0.438)	(0.298)	(0.198)					
Learners' self-efficacy	0.447	0.310	0.566	0.459	*0.786*			
	(0.187)	(0.091)	(0.356)	(0.211)				
Satisfaction	0.540	0.416	0.489	0.290	0.260	*0.804*		
	(0.285)	(0.328)	(0.269)	(0.078)	(0.068)			
Continued intentions	0.245	0.265	0.302	0.356	0.344	0.296	*0.810*	
	(0.097)	(0.105)	(0.128)	(0.167)	(0.156)	(0.134)		
Academic performance	0.325	0.291	0.289	0.298	0.322	0.410	0.187	*0.797*
	(0.108)	(0.083)	(0.081)	(0.089)	(0.129)	(0.234)	(0.068)	

Notes: The square roots of the AVEs are in parentheses. $^{**}p < 0.01$.

5.4 Descriptive statistics

The dimensions contributing to e-learning quality, instructor quality and self-regulatory efficacy on student's e-learning behaviour and academic performance were measured using the mean value and standard deviation. The maximum average was observed in system quality (M = 5.12) and minimum on information quality (M = 3.90). In contrast there was superior dispersal of agreement on system quality (S = 1.256) and lower dispersion of agreement in information quality (S = 0.567).

6 Data analysis and discussion

Data analysis is done as per the guidelines advised by Anderson and Gerbing (1988) and (Hair et al., 2014). The e-learning quality, instructor quality and self-efficacy dimensions in Table 3 were used for proposed model.

6.1 Measurement model

The maximum likelihood estimation test with covariance-based structured equation modelling (CB-SEM) was applied to estimate the assessment model and test the hypothesised associations with statistical software SPSS AMOS (v.23). To test the hypotheses, two sets of measurements were conducted. The reliability measures (Cronbach α) were used to examine inner consistency, dimensionality and homogeneity. As specified in Table 5, all values of Cronbach alpha were above the recommended cut-off of 0.70, which reflected internal consistency of the measurement instrument (Nunnally and Bernstein, 1994). Convergent validity was validated through AVE, was above 0.50 (Fornell and Larcker, 1981) which indicated that survey measures captured common construct (Carlson and Herdman, 2010). Discriminant validity was assessed through the squared multiple correlations among measures associated with AVE and for each individual construct item, AVE had a higher value. Discriminant validity was further proved with maximum shared variance (MSV) and average shared variance (ASV) was within appropriate range (Hair et al., 2014).

Table 6 Fit indices for CFA

Fit indices	*Estimates*
Normed Chi-square	1.668
(GFI)	0.965
(AGFI)	0.943
Normed fit index (NFI)	0.933
Incremental fit measures (IFI)	0.960
Trucker-Luis index (TLI)	0.941
Comparative fit measures (CFI)	0.949
Root mean square residual (RMR)	0.046
Root mean square error of approximation (RMSEA)	0.054

Table 7 Regression weights and statistical significance

Hypothesised path	*Regression load*	*Consistent regression load*	*Standard error*	*t-indices*	*p-value*	*Supported*
Information quality ⟶ Satisfaction (*H1a*)	0.456	0.719	0.063	7.158	***	Yes
System quality ⟶ Satisfaction (*H2a*)	0.358	0.688	0.079	6.122	***	Yes
Service quality ⟶ Satisfaction (*H3a*)	0.593	0.867	0.052	11.257	***	Yes
Instructor quality ⟶ Satisfaction (*H4a*)	0.523	0.816	0.059	10.554	***	Yes
Self-efficacy ⟶ Satisfaction (*H5a*)	0.556	0.845	0.046	10.890	***	Yes
Information quality ⟶ Continued intention (*H1b*)	0.468	0.728	0.067	7.967	***	Yes
System quality ⟶ Continued intention (*H2b*)	0.391	0.697	0.075	6.456	***	Yes
Service quality ⟶ Continued intention (*H3b*)	0.589	0.852	0.054	11.034	***	Yes
Instructor quality ⟶ Continued intention (*H4b*)	0.535	0.821	0.061	10.137	***	Yes
Self-efficacy ⟶ Continued intention (*H5b*)	0.578	0.849	0.049	10.930	***	Yes
Satisfaction ⟶ Continued intention (H6)	0.488	0.759	0.061	8.435	***	Yes
Satisfaction ⟶ Academic performance (*H7b*)	0.334	0.635	0.082	5.432	0.001	Yes

6.2 Structural model

CFA was then used to assess the constructs and convergent legitimacy (Hair et al., 2014). CFA is suitable for scale validation as well as to authorise the multidimensionality of an academic construct. The null model (χ^2 = 853.485, *df* = 511), distinct as a single-factor model without assessment errors (Hair et al., 2014), has a significance level of 0.000. The normed Chi-square (χ^2/df) = 1.668, was within the tolerable limit. Overall model statistics proposed a good model fit (GFI = 0.965; AGFI = 0.943; NFI = 0.933; IFI = 0.960; NNFI/TLI = 0.941; CFI = 0.959; RMR = 0.046) (Hair et al., 2014). RMSEA value below 0.080 is required, but lower than 0.05 reflects outstanding, and the present model revealed an RMSEA of 0.054, representing an overall good fit for the model (see Table 6).

6.3 Hypotheses testing

As can be seen, all the hypotheses exhibit statistically significant estimates. The path analysis indicates that e-learning quality, e.g., information quality, system quality, system

quality and instructor quality predicted students' satisfaction and continued intention. Students' self-efficacy influenced students' satisfaction and continued intention. Further, students' satisfaction had a significant influence on continued intentions and academic performance. In Table 7, the results are presented with the standardised regression weight estimates.

7 Discussion and implications

7.1 Discussion

E-learning is prevalent and valuable for HEIs and students. This paper supports to understand the relationships among e-learning quality, instructor quality, self-efficacy and students' shifting behaviours in terms of satisfaction and continued intentions as well as academic performance in e-learning era. Students' perception of e-learning quality drives desired behaviour (Alsabawy et al., 2013) and academic performance (Lee et al., 2009). Instructor quality is vital which influences students' desired e-learning outcomes (Ozkan and Koseler, 2009). This research confirms that students' self-efficacy for e-learning promotes satisfaction and continued intention (Popper, 1972). Further, students' satisfaction from e-learning system leads to continued intentions (Cheng, 2014) as well as better academic performance (Ho et al., 2010).

E-learning system should be able to provide information that are current, easy-to-understand, comprehensive, formatted and flexible that can be key to bring students' desired e-learning behaviour (Cheng, 2013). As there is lack of face-to-face teacher-students' interactions, quality of information delivered through e-learning system becomes critical to provide students' satisfaction and continued intention, where they can have better experience and want to continue using the same in future (Ramayah and Lee, 2012; Raspopovic et al., 2014). E-learning system that is reliable and able to deliver services in-time as per learners' requirements can exert positive effects on students' e-learning behaviour and performance (Chopra et al., 2019). E-learning platforms should be visually attractive, effortless, responsive, customised, adaptive and reliable so that students can perform required tasks with greater effectiveness in future (Uppal et al., 2017; Pham et al., 2019). E-learning system should be effortless and able to reduce complexities for learners while in use. E-learning system should be consistent, adaptable and facilitates interactions as well as provides content in different formats (Hsieh and Cho, 2011; Rui-Hsin and Lin, 2018). E-learning system quality fuels better understanding thereby results into more satisfaction and future intention to use the e-learning platform. Instructor quality plays crucial role in bringing students' e-learning behaviour (Ozkan and Koseler, 2009). Instructors are required to transform their skills, knowledge, pedagogy, interactions and attitude attuned to e-learning environment (Sun et al., 2008; Lee et al., 2009) that brings student delight and intention to continue with e-learning. It also helps to bring better students' learning outcomes. Learners' competencies and positive attitude to adapt innovative learning environment are pivotal for their favourable response as well as better results. Students' ability to use e-learning system enhances their overall experience of innovative teaching-learning process (Popper, 1972).

E-learning brings better learners' satisfaction that further promotes academic performance (Lee and Lee, 2008). Students' academic performance is considered as one of the important outcomes of e-learning. Students' perceived rational and emotional

gratification from e-learning stimulates academic performance. Students' higher gratification from e-learning system helps to improve their grades and knowledge compared to traditional learning (Ho et al., 2010).

7.2 Theoretical implications

This research examines the relationship between e-learning quality, instructor quality and students' self-efficacy and learners' behaviours and performance. Thus, investigating learners' perception regarding e-learning quality, instructor quality, students' self-efficacy and resulting behaviour as well as performance may expand the scope of the students' e-learning behaviour. HEIs can learn how they can enhance the quality of e-learning that leads to students' favourable behaviour and academic performance. So, this study comprises theoretical implications in the context of e-learning.

First, this study offers a useful model to measure students' e-learning behaviour. This research presents links between measures of quality for e-learning and subsequent students' e-learning behaviour and performance. Learners' perception regarding information quality, service quality, system quality, instructor quality and self-efficacy can be considered when predicting e-learning behaviour. This research proposes using a multidimensional scale to measure quality of e-leaning platforms. Second, this paper adds to the existing literature related to students' behaviour as a mediator between quality of e-learning and academic performance. Third, this research studied the potential antecedents and outcomes of students' e-learning behaviour.

7.3 Practical implications

This research brings guidelines for higher educational institutions and their management. The results of this study suggest that information quality, service quality, system quality, instructor quality and students' self-efficacy lead to positive e-learning behaviour and academic performance. The current findings reveal that students tend to perform well, as their perception towards e-learning system improves. Higher educational institutions should build e-learning systems that can provide easy-to-understand, comprehensive and up-to-date information in proper format and user-friendly manner backed by visually appealing and responsive platforms. HEIs need to train instructors to align their teaching techniques to elicit positive emotions and response from students in e-learning environments.

8 Conclusions and future research

This study explored the relationship between students' perception towards e-learning, resulting behaviour and subsequent academic performance. Students having adequate perception towards e-learning quality backed by instructor quality and students' self-efficacy will show positive behaviour that further affect positively their academic performance. This study offers significant contributions. First, previous research lacks empirical evidence regarding role of e-learning, instructor quality and students' self-efficacy in their behaviour and academic performance. The results of this study provide framework for measuring students' shifting preferences and behaviour in the era of e-learning. Second, this study examined how students' e-learning behaviour mediates

the relationships among e-learning quality, instructor quality, students' self-efficacy and academic performance. Third, this research considered academic performance as an outcome of students' e-learning behaviour.

This research concentrated on the students' perception towards e-learning system and their self-efficacy. Future research can inspect the students' attitude towards e-learning system and its effect on their actual behaviour and performance in e-learning context. Further research should include specific e-learning platform and relate students' e-learning behaviour. Future research should explore the possible influence of demographic, behavioural, psychographic and situational factors on students' e-learning behaviour. Value co-creation has been dominant in service marketing studies (Ahn et al., 2020). Past studies indicate the prominence of technology in value co-creation (Mele et al., 2021). So, value co-creation can be included in further research as an outcome of e-learning process. Future research can also consider artificial intelligence in e-learning and its effects on students' behaviour and academic performance (Tan and Cheah, 2021). The ISSM model used in this study can be extended to other online service context like ride-hailing services, online travel booking service, etc. where the quality of information provided, online system as well as services delivered by such online platforms have utmost importance, and comparable to e-learning environment.

References

Agariya, A.K. and Singh, D. (2012) 'e-learning quality: scale development and validation in Indian context', *Knowledge Management & E-Learning: An International Journal*, Vol. 4, No. 4, pp.500–517.

Agarwal, R., Sambamurthy, V. and Stair, R.M. (2000) 'The evolving relationship between general and specific computer self-efficacy – an empirical assessment', *Research Report*, Vol. 11, No. 4, pp.1–432.

Ahn, J., Back, K.J., Barišić, P. and Lee, C.K. (2020) 'Co-creation and integrated resort experience in Croatia: the application of service-dominant logic', *Journal of Destination Marketing & Management*, Vol. 17, pp.1–8.

Alsabawy, A.Y., Cater-Steel, A. and Soar, J. (2013) 'E-learning service delivery quality: a determinant of user satisfaction', in Kats, Y. (Ed.): *Learning Management Systems and Instructional Design: Best Practices in Online Education*, pp.89–127, Information Science Reference, Hershey, PA.

Anderson, J. and Gerbing, D.W. (1988) 'Structural equation modeling in practice: a review and recommended two-step approach', *Psychological Bulletin*, Vol. 103, No. 3, pp.411–423.

Anderson, R.E. and Srinivasan, S.S. (2003) 'E-satisfaction and e-loyalty: a contingent framework', *Psychology and Marketing*, Vol. 20, pp.123–138.

Au, N., Eric, W.T.N. and Cheng, T.C.E. (2002) 'A critical information system satisfaction research and a new research framework', *Omega*, Vol. 30, pp.451–478.

Bailey, J.E. and Pearson, S.W. (1983) 'Development of a tool for measuring and analyzing computer user satisfaction', *Management Science*, Vol. 29, No. 5, pp.530–545.

Bandura, A. (1986) *Social Foundations of Thought and Action: A Social Cognitive Theory*, Prentice-Hall, Englewood Cliffs, NJ.

Bandura, A. (1997) *Self-Efficacy: The Exercise of Control*, pp.79–113, W.H. Freeman and Company, New York.

Baturay, M.H. (2010) 'Relationships among sense of classroom community, perceived cognitive learning and satisfaction of students at an e-learning course', *Interactive Learning Environments* [online] http://pdfserve.informaworld.com/287687_788837034_922292781.pdf/ (accessed 2 July 2020).

Bhattacherjee, A. (2001) 'An empirical analysis of the antecedents of electronic commerce service continuance', *Decision Support Systems*, Vol. 3, No. 2, pp.201–214.

Bhattacherjee, A. and Barfar, A. (2011) 'Information technology continuance research: current state and future directions', *Asia Pacific Journal of Information System*, Vol. 21, No. 2, pp.1–18.

Bhattacherjee, A., Perols, J. and Sanford, C. (2008) 'Information technology continuance: a theoretic extension and empirical test', *Journal of Computer Information Systems*, Vol. 49, No. 1, pp.17–26.

Blut, M., Wang, C. and Schoefer, K. (2016) 'Factors influencing the acceptance of self-service technologies: a meta-analysis', *Journal of Service Research*, Vol. 19, No. 4, pp.396–416,

Boulding, W., Kalra, A., Staelin, R. and Zeithaml, V.A. (1993) 'A dynamic process model of service quality: from expectations to behavioral intentions', *Journal of Marketing Research*, Vol. 30, No. 1, pp.7–27.

Carlson, K.D. and Herdman, A.O. (2010) 'Understanding the impact of convergent validity on research results, *Organizational Research Methods*, Vol. 15, No. 1, pp.17–32.

Cheng, C.C. (2013) 'Exploring the determinants of e-learning systems continuance intention in academic libraries', *Library Management*, Vol. 34, Nos. 1/2, pp.40–55.

Cheng, Y.M. (2012) 'Effects of quality antecedents on e-learning acceptance', *Internet Research*, Vol. 22, No. 3, pp.361–390.

Cheng, Y.M. (2014) 'Extending the expectation-confirmation model with quality and flow to explore nurses' continued blended e-learning intention', *Information Technology and People*, Vol. 27, No. 3, pp.230–258.

Chiou, W-B. and Wan, C-S. (2007) 'The dynamic change of self-efficacy in information searching on the internet: influence of valence of experience and prior self-efficacy', *The Journal of Psychology*, Vol. 141, No. 6, pp.589–603.

Chiu, C.M., Sun, S.Y., Sun, P.C. and Ju, T.L. (2007) 'An empirical analysis of the antecedents of web-based learning continuance', *Computers & Education*, Vol. 49, No. 4, pp.1224–1245.

Choi, D.H., Kim, J. and Kim, H. (2007) 'ERP training with a web-based electronic learning system: the flow theory perspective', *International Journal of Human-Computer Studies*, Vol. 65, No. 3, pp.223–243.

Chopra, G., Madan, P., Jaisingh, P. and Bhaskar, P. (2019) 'Effectiveness of e-learning portal from students' perspective: a structural equation model (SEM) approach', *Interactive Technology and Smart Education*, Vol. 16, No. 2, pp.94–116.

Compeau, D.R. and Higgins, C.A. (1995) 'Computer self-efficacy: development of a measure and initial test', *MIS Quarterly*, Vol. 19, No. 2, pp.189–211.

Cunningham, L.F., Young, C.E. and Gerlach, J. (2009) 'A comparison of consumer views of traditional services and self service technologies', *Journal of Services Marketing*, Vol. 23, No. 1, pp.11–23.

Curran, J.M. and Meuter, M.L. (2005) 'Self-service technology adoption: comparing three technologies', *Journal of Services Marketing*, Vol. 19, No. 2, pp.103–113.

DeLone, W.H. and McLean, E.R. (1992) 'Information systems success: the quest for the dependent variable', *Information Systems Research*, Vol. 3, No. 1, pp.60–95.

DeLone, W.H. and McLean, E.R. (2003) 'The DeLone and McLean model of information systems success: a ten-year update', *Journal of Management Information Systems*, Vol. 19, No. 4, pp.9–30.

Delone, W.H. and McLean, E.R.,(2004), 'Measuring e-commerce success: applying the Delone & Mclean information systems success model', *International Journal of Electronic Commerce*, Vol. 9, No. 1, pp.31–47.

Ding, D.X., Hu, P.J.H. and Sheng, O.R.L. (2011) 'e-SELFQUAL: a scale for measuring online self-service quality', *Journal of Business Research*, Vol. 64, No. 5, pp.508–515.

Ehlers, U.D. (2004) 'Quality in e-learning from a learner's perspective', *European Journal of Open, Distance and E-learning*, Vol. 7, No. 1, pp.1–8.

Ehlers, U.D. (2009) 'Web 2.0 – e-learning 2.0 – quality 2.0? Quality for new learning cultures', *Quality Assurance in Education*, Vol. 17, No. 3, pp.296–314.

Ellis, R.A., Ginns, P. and Piggot, L. (2009) 'E-learning in higher education: some key aspects and their relationship to approaches to study', *Higher Education Research and Development*, Vol. 28, No. 3, pp.303–318.

Farid, S., Ahmad, R., Alam, M., Akbar, A. and Chang, V. (2018) 'A sustainable quality assessment model for the information delivery in e-learning systems', *Information Discovery and Delivery*, Vol. 46, No. 1, pp.1–25.

Ferran, N., Casadesús, J., Krakowska, M. and Minguillón, J. (2007) 'Enriching e-learning metadata through digital library usage analysis', *The Electronic Library*, Vol. 25, No. 2, pp.148–165.

Fornell, C. and Larcker, D.F. (1981) 'Evaluating structural equation models with unobservable variables and measurement error', *Journal of Marketing Research*, Vol. 18, No. 1, pp.39–50.

Girasoli, A.J. and Hannafin, R.D. (2008) 'Using asynchronous AV communication tools to increase academic self-efficacy', *Computers & Education*, Vol. 51, pp.1676–1682.

Gombachika, H.S.H. and Khangamwa, G. (2013) 'ICT readiness and acceptance among TEVT students in University of Malawi', *Campus-Wide Information Systems*, Vol. 30, No. 1, pp.35–43.

Hair Jr, J.H., Balck, W.C., Babin, B.J., Anderson, R.E. and Tatham, R.L. (2014) *Multivariate Data Analysis*, Pearson Education, New Delhi.

Ho, L.A., Kuo, T.H. and Lin, B. (2010) 'Influence of online learning skills in cyberspace', *Internet Research*, Vol. 20, No. 1, pp.55–71.

Hoffman, B. and Spatariu, A. (2008) 'The influence of self-efficacy and metacognitive prompting on math problem-solving efficiency', *Contemporary Educational Psychology*, Vol. 33, No. 4, pp.875–893.

Hsieh, P.A.J. and Cho, V. (2011) 'Comparing e-learning tools' success: the case of instructor-student interactive vs. self-paced tools', *Computers and Education*, Vol. 57, No. 3, pp.2025–2038

Islam, A.N. (2011) 'Extending information system continuance theory with system quality in e-learning context', *AMCIS*.

Islam, A.Y.M.A., Mok, M.M.C., Xiuxiu, Q. and Leng, C.H. (2018) 'Factors influencing students' satisfaction in using wireless internet in higher education: cross-validation of TSM', *The Electronic Library*, Vol. 36, No. 1, pp.2–20.

Kalogiannakis, M. and Papadakis, S. (2019) 'Evaluating pre-service kindergarten teachers' intention to adopt and use tablets into teaching practice for natural sciences', *International Journal of Mobile Learning and Organisation*, Vol. 13, No. 1, pp.113–127.

Kang, S.Y., Kim, S.H., Kwon, Y.E., Kim, T.B., Park, H.K., Park, H.W., Chang, Y.S., Jee, Y.K., Moon, H.B., Min, K.U. and Cho, S.H. (2018) 'The virtual asthma guideline e-learning program: learning effectiveness and user satisfaction', *The Korean Journal of Internal Medicine*, Vol. 33, No. 3, p.604–614.

Karsten, R. and Roberta, R. (1998) 'Computer self-efficacy: a practical indicator of student computer competency in introductory IS courses', *Informing Science*, Vol. 1, No. 3.

Katsaris, I. and Vidakis, N. (2021) 'Adaptive e-learning systems through learning styles: a review of the literature', *Advances in Mobile Learning Educational Research*, Vol. 1, No. 2, pp.124–145.

Lai, M.L. (2008) 'Technology readiness, internet self-efficacy and computing experience of professional accounting students', *Campus-Wide Information Systems*, Vol. 25, No. 1, pp.18–29.

Learnframe (2002) *Facts, Figures and Forces behind E-Learning* [online] https://www.learnframe.com/aboutelearning/elearningfacts.pdf (accessed 20 April 2022).

Lee, H., Choi, S.Y. and Kang, Y.S. (2009) 'Formation of e-satisfaction and repurchase intention: moderating roles of computer self-efficacy and computer anxiety', *Expert Systems with Applications*, Vol. 36, No. 4, pp.7848–7859.

Lee, H., Kim, J. and Kim, J. (2007) 'Determinants of success for application service provider: an empirical test in small businesses', *International Journal of Human-Computer Studies*, Vol. 65, No. 9, pp.796–815.

Lee, J.K. and Lee, W.K. (2008) 'The relationship of e-Learner's self-regulatory efficacy and perception of e-Learning environmental quality', *Computers in Human Behaviour*, Vol. 24, No. 1, pp.32–47.

Lee, W.J. (2010) 'Online support service quality, online learning acceptance, and student satisfaction', *Internet and Higher Education*, Vol. 13, No. 1, pp.227–283.

Lee-Post, A. (2009) 'e-Learning success model: an information systems perspective', *Electronic Journal of E-Learning*, Vol. 7, No. 1, pp.61–70.

Liaw, S.S. (2008) 'Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: a case study of the blackboard system', *Computers and Education*, Vol. 51, No. 2, pp.864–873.

Liu, C.T., Guo, Y.M. and Lee, C.H. (2010) 'The effects of relationship quality and switching barriers on customer loyalty', *International Journal of Information Management*, Vol. 31, pp.71–79.

Lwoga, E.T. (2014) 'Critical success factors for adoption of web-based learning management systems in Tanzania', *International Journal of Education and Development using Information and Communication Technology*, Vol. 10, No. 1, pp.4–21.

Majanja, M.K. (2020) 'The status of electronic teaching within South African LIS education', *Library Management*, Vol. 41, Nos. 6/7, pp.317–337.

Marakas, G., Johnson, R. and Clay, P.F. (1998) 'The evolving nature of the computer self-efficacy construct: an empirical investigation of measurement construction, validity, reliability and stability over time', *Journal of the Association for Information Systems*, Vol. 8, No. 1, pp.32–67.

Masoumi, D. and Lindstrom, B. (2012) 'Quality in e-learning: a framework for promoting and assuring quality in virtual institutions', *Journal of Computer Assisted Learning*, Vol. 28, pp.27–41.

McKinney, V., Yoon, K. and Zahedi, F. (2002) 'The measurement of web customer satisfaction: an expectation and disconfirmation approach', *Information Systems Research*, Vol. 13, No. 3, pp.296–315.

McVay, M. (2000) *How to be a Successful Distant Learning Student: Learning on the Internet*, Prentice Hall, New York.

Mele, C., Spena, T.R., Kaartemo, V. and Marzullo, M.L. (2021) 'Smart nudging: how cognitive technologies enable choice architectures for value co-creation', *Journal of Business Research*, Vol. 129, pp.949–946.

MEST (2008) *A Report on Comprehensive Evaluation of Cyber Universities in 2008*, Korean Ministry of Education Science and Technology, Seoul.

Mohammed, D.Y. (2022) 'The web-based behavior of online learning: an evaluation of different countries during the COVID-19 pandemic', *Advances in Mobile Learning Educational Research*, Vol. 2, No. 1, pp.263–267.

Moos, D.C. and Azevedo, R. (2009) 'Learning with computer-based learning environments: a literature review of computer selfefficacy', *Review of Educational Research*, Vol. 79, No. 2, pp.576–600.

Mosa, A.A., Mahrin, M.N. and Ibrrahim, R. (2016) 'Technological aspects of e-learning readiness in higher education: a review of literature', *Computer and Information Science*, Vol. 9, No. 1, pp.113–127.

Nunnally, J. C. and Bernstein, I.H. (1994) *Psychometric Theory*, McGraw-Hill, New York, NY.

Oliver, R.L. (1999) 'Whence consumer loyalty?', *Journal of Marketing*, No. 63, pp.33–44.

Ozkan, S. and Koseler, R. (2009) 'Multi-dimensional students' evaluation of e-learning systems in the higher education context: an empirical investigation', *Computers & Education*, Vol. 53, No. 4, pp.1285–1296.

Pajares, F. and Schunk, D.H. (2001), 'Self-beliefs and school success: self-efficacy, self-concept, and school achievement', in Riding, R. and Rayner, S. (Eds.): *Perception*, pp.239–266, Ablex Publishing, London.

Papadakis, S. (2018) 'Evaluating pre-service teachers' acceptance of mobile devices with regards to their age and gender: a case study in Greece', *International Journal of Mobile Learning and Organisation*, Vol. 12, No. 4, pp.336–352.

Park, Y.A. and Gretzel, U. (2007) 'Success factors for destination marketing web sites: a qualitative meta-analysis', *Journal of Travel Research*, Vol. 46, No. 1, pp.46–63.

Pawlowski, J.M. (2006) 'Adopting quality standards for education and e-learning', in *Handbook on Quality and Standardisation in E-Learning*, Springer, Berlin, Heidelberg.

Peng, H., Tsai, C-C. and Wu, Y-T. (2006) 'University students' self-efficacy and their attitudes toward the internet: the role of students' perceptions of the Internet', *Educational Studies*, Vol. 32, pp.73–86.

Perez, M.S., Adad, J.C.G., Carrillo, G.M.M. and Fernandez, R.S. (2007) 'Effects of service quality dimensions on behavioural purchase intentions: a study in public-sector transport', *Managing Service Quality: An International Journal*, Vol. 17, No. 2, pp.134–151.

Pham, L., Limbu, Y.B., Bui, T.K., Nguyen, H.T. and Pham, H.T. (2019) 'Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam', *International Journal of Educational Technology in Higher Education*, Vol. 16, No. 7, pp.1–26.

Pollack, K.I.R. (2007) *Assessing Student Expectations and Preferences for the Distance Learning Environment: Are Congruent Expectations and Preferences A Predictor of High Satisfaction?*, [online] http://proquest.umi.com/pqdweb?did¼1410678241andsid¼3andFmt¼2andclientId¼17631andRQT¼309andVName¼PQD (accessed 20 July 2020).

Popper, K. (1972) *Objective Knowledge: An Evolutionary Approach*, Oxford University Press, London.

Ramayah, T. and Lee, J.W.C. (2012) 'System characteristics, satisfaction and e-learning usage: a structural equation model (SEM)', *TOJET: The Turkish Online Journal of Educational Technology*, Vol. 11, No. 2, pp.196–206.

Ranaweera, C., Bansal, H. and McDougall, G. (2008) 'Web site satisfaction and purchase intentions: impact of personality characteristics during initial web site visit', *Managing Service Quality*, Vol. 18, No. 4, pp.329–348.

Ranjbarfard, M. and Heidari Sureshjani, M. (2018) 'Offering a framework for value co-creation in virtual academic learning environments', *Interactive Technology and Smart Education*, Vol. 15, No. 1, pp.2–27.

Raspopovic, M., Jankulovic, A., Runic, J. and Lucic, V. (2014) 'Success factors for e-learning in a developing country: a case study of Serbia', *International Review of Research in Open and Distributed Learning*, Vol. 15, No. 3, pp.1–23.

Robertson, N., McDonald, H., Leckie, C. and McQuilken, L. (2016) 'Examining customer evaluations across different self-service technologies', *Journal of Services Marketing*, Vol. 30, No. 1, pp.88–102.

Roca, J.C., Chiu, C.M. and Martínez, F.J. (2006) 'Understanding e-learning continuance intention: an extension of the technology acceptance model', *International Journal of Human-Computer Studies*, Vol. 64, No. 8, pp.683–696.

Ronald, P and Jamie, M (2000) *Quality on the Line: Benchmarks for Success in Internet-based Distance Education* [online] https://files.eric.ed.gov/fulltext/ED444407.pdf (accessed 10 January 2022).

Rui-Hsin, K. and Lin, C.T. (2018) 'The usage intention of e-learning for police education and training', *Policing: An International Journal*, Vol. 41, No. 1, pp.98–112.

Shah, T.R., Shah, T. and Jain, A. (2021) 'The role of technology readiness in students' perception and behaviour towards e-learning technologies', *International Journal of Learning Technology*, Vol. 16, No. 3, pp.197–224.

Shee, D.Y. and Wang, Y.S. (2008) 'Multi-criteria evaluation of the web-based e-learning system: a methodology based on learner satisfaction and its applications', *Computers and Education*, Vol. 50, No. 3, pp.894–905.

Sørebø, Ø., Halvari, H., Gulli, V.F. and Kristiansen, R. (2009) 'The role of self-determination theory in explaining teachers' motivation to continue to use e-learning technology', *Computer and Education*, Vol. 53, No. 4, pp.1177–1187.

Sun, P.C., Tsai, R.J., Finger, G., Chen, Y.Y. and Yeh, D. (2008) 'What drives successful e-Learning? An empirical investigation of the critical factors influencing learner satisfaction', *Computers and Education*, Vol. 500, No. 4, pp.1183–1202.

Tan, D.Y. and Cheah, C.W. (2021) 'Developing a gamified AI-enabled online learning application to improve developing a gamified AI-enabled online learning application to improve', *Computers and Education: Artificial Intelligence*, Vol. 2, No. 1, p.100032.

Tong, Y.K. (2009) 'A study of e-recruitment technology adoption in Malaysia', *Industrial Management & Data Systems*, Vol. 109, No. 2, pp.281–300.

Tsai, C.C., Chuang, S.C., Liang, J.C. and Tsai, J.M., (2011) 'Self-efficacy in internet-based learning environments: a literature review', *Educational Technology & Society*, Vol. 14, No. 4, pp.222–240.

Tsourela, M., Paschaloudis, D. and Fragidis, G. (2014) 'Value co-creation and university teaching services: the case of teachers' evaluation process', *International Journal of Scientific & Technology Research*, Vol. 3, No. 2, pp.243–249.

Uppal, M.A., Ali, S. and Gulliver, S.R. (2017) 'Factors determining e-learning service quality', *British Journal of Educational Technology*, Vol. 49, No. 3, pp.412–426.

Waight, C. and Stewart, B. (2005) 'Valuing the adult learner in e-learning: part two – insights from our companies', *Journal of Workplace Learning*, Vol. 17, Nos. 5–6, pp.398–414.

Wang, Y.S. (2003) 'Assessment of learner satisfaction with asynchronous electronic learning systems', *Information & Management*, Vol. 41, No. 1, pp.75–86.

Watanabe, C., Naveed, K. and Neittaanmmaki, P. (2017) 'Co-evolution between trust in teachers and higher education toward digitally-rich learning environments', *Technology in Society*, Vol. 48, pp.70–86.

WebCT (2006) *WebCT Campus Edition Brochure* [online] http://webct.com/service/ViewContent?contentID=6205796 (accessed 17 December 2021).

Wieser, D. and Seeler, J-M. (2018) 'Online, not distance education: the merits of collaborative learning in online education', in Altmann, A., Ebersberger, B., Mössenlechner, C. and Wieser, D. (Eds.): *The Disruptive Power of Online Education*, pp.125–146, Emerald Publishing Limited, Bingley.

Yen, H.R. and Gwinner, K.P. (2003) 'Internet retail customer loyalty: the mediating role of relational benefits', *International Journal of Service Industry Management*, Vol. 14. No. 5, pp.483–501.

Yukselturk, E. and Bulut, S. (2007) 'Predictors for student success in an online course', *Educational Technology & Society*, Vol. 10, No. 2, pp.71–83.