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AN ANALYSIS TO UNDERSTAND THE ONLINE LEARNERS' SUCCESS IN PUBLIC HIGHER EDUCATION IN MOROCCO

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ABSTRACT

Aim/Purpose	This study focuses on the learners' success toward learning management systems in higher education in Morocco and also proposes a theoretical model to better understand the determinants of learners' satisfaction, self-regulation and continuance intention to use these systems. For this purpose, variables which may have a positive or negative influence in our model are examined.
Background	The latest version of the technology acceptance model, expectation–confirmation model, DeLone and McLean Information systems success model and self-regulated learning theory, have been used. This study proposes a causal model named e-learner success assessment model or e-LSAM.
Methodology	In this study, a structural equation model (SEM) approach was used for the empirical validation and testing of correlation hypotheses between e-LSAM constructions.
Contribution	This research extends previous literature on the factors that can contribute to learners' use, engagement, satisfaction and success in an e-learning system, we also propose a causal model named e-learner success assessment model (e-LSAM).
Findings	The results indicate that, learner's success in an e-learning system could be explained by self-regulation and learners' intention to continue using LMS, which is explained by learners' satisfaction. The results also show that the system quality,

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	course and information quality, course flexibility, diversity in assessments and social interactions can improve learners' satisfaction with LMS platforms
Impact on Society	This study will enable the university and higher school in Morocco to better understand the critical factors to be undertaken to improve student performance and educational levels.
Future Research	This document is a general overview of factors that help to understand learner's success in an eLearning system; it is not without limitations. Our research did not take into account the effects of demographic attributes such as gender, age, level of education and others. More specifically, Morocco, like any other country, has its own traditions and culture, future research should explore how these aspects influence the success of learners in an e-learning system.
Keywords	continuance usage, e-learning, learner satisfaction, self-regulation, learning management systems, learners' success, causal model

INTRODUCTION

In the last few years, information and communication technologies (ICT) have become an increasingly important component in all sectors of our lives (Jorgenson & Vu, 2016; Kirkman & Schwab, 2002). They also play a major role in the competitiveness and efficiency of companies (Birt, Wells, Kavanagh, Robb, & Bir, 2018; Rao, 2001). ICT refers to all computers, audiovisual, multimedia, Internet and other electronic equipment that enable users to communicate, access information sources, store, manipulate, produce and transmit information in all forms. These technologies are a good practical solution in the field of e-learning, where the learner uses computer and Internet tools to access distance learning courses. In addition, they can be powerful tools for motivation and commitment through the transformations they are able to bring to traditional ways of learning and communicating (Agrawal & Mittal, 2018).

E-Learning commonly called E-training, is the result of the application of the Internet and ICTs to the field of training (Kattoua, Al-Lozi, & Alrowwad, 2016). It embodies a new learning philosophy, offering learners the opportunity to follow distance learning from any computer equipment with an Internet connection, whereby lessons can be adapted to suit individual circumstances. Nichols (2003) defines e-learning as the use of technological learning tools in a web-based distance education mode as the main method of learning and interacting for educational purposes. Horton (2011) defines e-learning as a collection of instructions transmitted by all electronic means such as the Internet, intranets and extranets. Cidral, Oliveira, Felice and Aparicio (2018) define e-learning as a web-based learning ecosystem to ensure the dissemination of information, communication and knowledge for education and training.

Learning Management Systems (LMS) are web-based applications that are used as a technology to deliver e-learning. They make it easier to manage, organize and follow online courses. In addition to providing technology as an intermediary between teacher and learner, LMS allows learning to be tracked and reported to help managers make better decisions (Radwan, 2014). They also play a supporting role in providing training at a lower cost than traditional forms based on the presence of participants. In LMS, there is no problem with teacher schedules or classroom availability. Everyone can follow the training they want, at their own pace and according to their own availability, thus ensuring fast, efficient learning, with a minimum of logistics and especially of time wasted. For example, a course that takes one month in a traditional training course can be done in 5 days in e-learning with the possibility of communicating with the instructor by messages.

The use of LMS is undoubtedly one of the recent trends with a very high growth rate in higher education (Mtebe, 2015). Motivated by benefits such as geographical scope, learner control (in terms of flexibility and convenience), easier access to information, high-quality content, reduced training costs,

training at the learner's pace and with a sense of responsibility, public or private educational institutions are adopting e-learning by implementing a range of platforms available to their students (Hu & Hui, 2012).

The learner who has successfully completed his or her online training can be described as autonomous (J.-K. Lee & Hwang, 2007; Matzat & Vrieling, 2016; Müller & Seufert, 2018), motivated (Alraimi, Zo, & Ciganek, 2015; Grolnick & Raftery-Helmer, 2015) and with good digital skills. But although e-learning has many advantages, it also has its limitations. The dropout rate is very high, resulting in a success rate that is often lower than that obtained by students taking the same course in the classroom.

According to a study by Diaz (2002), the drop-out rate for an online course would be 13.5% compared to 7.2% for the classroom mode. These statistics are more alarming in a study conducted by EDX, only 17% of registered learners have consulted the courses and 8% have a certificate that validates the end of MOOCs (Hennessy, 2016). Recently, another study from the Massachusetts Institute of Technology sets the warning bell ringing (Reich & Ruipérez-Valiente, 2019), in this study, on a total of 12.67 million registrations in free online EdX courses by 5.63 million learners from 2012 to 2018, only 6% of online course participants were able to complete their training in 2013-2014, compared to 3.13% last year. Even among participants who paid for "audited" courses, 46% completed the courses in 2017-2018 compared to 56% in 2016-2017. In light of these figures, it would therefore be interesting to look for critical factors that can influence a student's drop-out and success rate in an online learning system.

Although the effective adoption of ICT is still in its infancy in the Moroccan education system, the reform of higher education proposed by the Higher Education, Training and Scientific Research Council (2019), demonstrates a great desire for success. This reform provides trainings to encourage and support teachers to adopt new technologies (e.g. design, development and implementation of online courses, online tutoring, ...), blended learning for learner (face-to-face and online) as well as the implementation of procedures for validating courses or pedagogical content through a pedagogical service offered by the institution to the learner. Of course, the effective use of digital technologies does not rely solely on a national policy in this regard. It is also necessary that the actors (teachers and learners) appropriate these technologies in their learning mode. In this article we propose a study to help promote the success of students and their retention within the Moroccan education system.

For the last fifteen years, the researchers proposed several theories and models to understand the added value of e-learning on students compared to traditional learning. Through this article, we will attempt to answer three research questions that have been formulated:

1. How can we foster self-regulation and student satisfaction?
2. How can we reduce the dropout rate in e-learning?
3. What factors affect learner success in e-learning systems?

The remainder of this paper is organized as follows: Section 2 examines the literature on key theories and models presenting a number of factors that can contribute to learners' use, engagement, satisfaction and success in an e-learning system. In Section 3, we explain how our causal model was developed and justify our research hypotheses. Section 4 describes the approach to data collection. Section 5 discusses the evaluation of the measurement model using structural equation modelling (SEM). Section 6 provides a discussion of the study results and outlines the implications of our research. Finally, section 7 presents a conclusion, limitations of our studies as well as future research opportunities.

THEORETICAL BACKGROUND

This section reviews the work on key models and theories indicating the factors that may explain the online learners' continuance intention, as well as learners' satisfaction and engagement with the e-learning system.

EXPECTATION–CONFIRMATION MODEL

The expectation confirmation model (ECM) was developed by Bhattacherjee in 2001 to present the factors that help to understand user satisfaction and the intention to continue using information systems (IS) (Bhattacherjee, 2001). The origins of this model known as the information systems continuity system can be traced back to institutional research done in previous years in the field of marketing using the theory of confirmation of expectations (ECT), which is the basis of ECM (Halilovic & Cicic, 2013; Oghuma, Libaque-Saenz, Wong, & Chang, 2016; Venkatesh, Thong, Chan, Hu, & Brown, 2011). It is an important model because it highlights the differences between first use and long-term use. This model has four variables:

- Confirmation: This variable is defined as the perception of the balance between the expectations of the users of the system and the real performance of the same system;
- Perceived usefulness: This variable represents the perception of what users will obtain by using the system;
- Satisfaction: This variable represents the emotional perception of previous use of the system;
- IS Continuance intention: This variable refers to users' intention to use the system. This is the target variable that the model attempts to predict.

Several studies in e-learning contexts have used the ECM model to investigate student satisfaction and the intention to continue using e-learning systems. Chiu, Hsu, Sun, Lin, and Sun (2005) proposes a model adapted from the ECM model to explain the continuance intention in an LMS. Their study was conducted on a population of 10 class sections that were conducted using an e-learning service as part of a continuous training program at a Taiwanese University. The results of their studies suggest that students' intent-to-continue using the service is determined by their satisfaction, which is in turn determined jointly by perceived usability, perceived quality, perceived value, and the level of students' expectations of the service. Lin and Wang (2012) also propose a research framework based on the ECM model to study the relationship between perceived adjustment and system factors that can motivate learners to continue using an e-learning system in blended learning they concluded that learners' perceived usefulness in using an e-learning system positively affects their satisfaction with the system, the latter in turn affects their intention to continue using the same system. Chow and Shi (2014) empirically examined students' antecedents of satisfaction and intent to continue learning in e-learning based on ECM model, and they also expanded the latter model by adding four other factors (course design, learning process, tutor and peer interaction). The results of this study showed that confirmation of student expectations is important to predict the four proposed factors, but only the learning process and course design played a role in predicting satisfaction and e-learning continuance intention.

TECHNOLOGY ACCEPTANCE MODEL

Developed by Davis, Bagozzi, and Warshaw in 1989, Technology acceptance model (TAM) is generally referred to as the most influential and commonly used theory in IS. This model is based essentially on two factors: perceived utility and perceived ease of use. These two factors are expected to predict how users will behave regarding the adoption of an innovative technology (Davis, Bagozzi & Warshaw, 1989). In 1996, Venkatesh and Davis modified the TAM model and suggested that perceived utility and perceived ease of use had direct effects on individual intent to use the system. According to the authors, individual intention to use the system was defined as the degree to which

users intend to adopt the technology or increase its use (Venkatesh & Davis, 1996). In 2000, Davis and Venkatesh proposed an extension of the model, called the TAM2. In this version, the authors have identified the main factors of perceived usefulness, namely, subjective norm, image, job relevance, output quality, result demonstrability and perceived ease of use (Venkatesh & Davis, 2000). The first two factors fall into the category of social influence and the other determinants are the characteristics of the system.

In 2008, Venkatesh and Bala combined the TAM2 model and the determinants of perceived ease of use model (Venkatesh, 2000), and developed the global technology acceptance model, called TAM3 (Venkatesh & Bala, 2008). This model highlights several factors that play a role in the adoption and use of technology by individuals. In this version, the authors included variables to determine perceived ease of use, namely, computer self-efficacy, computer anxiety, computer playfulness, perceptions of external control, perceived enjoyment and objective usability. The latter two were defined as two suggested systemic adjustments. In their research (Venkatesh & Bala, 2008), Venkatesh and Bala found that the role of two factors - IT self-efficiency and perceptions of external control - will continue to be significant despite the fact that the user gains more experience with the system, on the opposite, with the effects of the other two factors, namely, IT anxiety and IT enjoyment which have been theorized to diminish over time. In addition, the authors concluded that with more practical experience with the system, the effects of perceived enjoyment and objective usability adjustments on perceived ease of use increased.

Many previous studies have used the various versions of TAMs as a research framework to study the adoption and use of e-learning systems by individuals. M.-C. Lee (2010) combined the ECM, TAM, the theory of planned behavior (TPB) and the flow theory to design a theoretical model with factors that explain and predict the users' intentions to continue using e-learning. Its results show that user satisfaction has the most significant effect on their intentions to continue training, followed by perceived usefulness, concentration and subjective norm. Chow and Shi (2014) examine user satisfaction and the intentions to continue using e-learning system based on the two models ECM and TAM. The authors propose four factors, namely, the learning process, tutor interaction, peer interaction and course design. The results show that of these four factors, the learning process and course design are the only two factors that have a direct influence on satisfaction and intention to continue using the system. Wook, Zawiyah, Zakree, and Nazri (2015) uses the latest version of the Technology Acceptance Model (TAM3) to test all the hypotheses of this model in a public higher education environment in Malaysia. The result of their studies indicate that all the proposed hypotheses are supported. A very recent study in Spain based on the TAM model test on 245 students who took the online computer course (Estriegana, Medina-Merodio, & Barchino, 2019), the results of this study confirm the purpose of the TAM model and demonstrate that it is a good theoretical tool to understand the acceptance of such a system by users.

DeLone and McLean Information Systems Success Model

While companies continue to adopt and use information systems (IS) to improve their services, increase sales, reach more customers and be more competitive in anticipating environmental changes, some systems are not as efficient and do not make it easier for managers to make decisions. As a result, many models have been developed to evaluate the effectiveness of IS in various contexts. The most dominant model is the DeLone and McLean information systems success (D&M ISS) of 1992 and 2003.

The original model (DeLone & McLean, 1992), consists of six elements: system quality, information quality, system usage, user satisfaction, individual impact and organizational impact. System quality measures the quality of the system itself while information quality measures the quality of the information produced by the system. Both constructs have a direct influence on the use of the system and user satisfaction, which in turn has an impact on the user. The D&M ISS model has been reviewed by several researchers to improve it in order to respond to the evolution of the new technology

industry. In 2003, the authors incorporated suggestions from researchers and extended it to have the D&M ISS model updated (Delone & Mclean, 2003). This version saw the emergence of the quality of service factor as a new construction in the model to measure the quality of service provided by the IT entity, since many organizations tend to outsource IT services to a separate IT entity. Similarly, two factors, individual impact and organizational impact, were merged to form a single factor named by the authors, net benefits. The latter is defined as the extent to which IS contributes to the success of individuals, groups, organizations, industries and nations. DeLone and McLean maintained that their models were not a generic model for measuring the success of IS. They argued that researchers would expand or reduce the number of factors so that they could adapt in their study context. Consequently, the evolution of e-learning systems has reinforced the need to extend this model to measure the success of these systems in various educational contexts.

The majority of studies that have extended the D&M ISS model have been validated in higher education with the aim of developing successful models for the implementation of e-learning systems. Ozkan and Koseler (2009) extended the D&M ISS model by dividing its constructions into two categories: technical and social factors to form the hexagonal e-learning assessment model (HELAM). In fact, only two factors were retained in the D&M ISS model, system quality and service quality. While adding four new constructions, content quality, learner perspective, instructor attitudes and supportive issues. The model was considered appropriate and useful for evaluating the success of the e-learning system. Mohammadi (2015) combined the TAM and D&M ISS model to study learners' perceptions and, consequently, to analyze the quality characteristics that influence learners' satisfaction and intentions regarding the use of e-learning systems as well as the perceived effects of usefulness and ease of use. The results concluded that the quality of the system, of the service and of the content are defined as the principal variables that influence satisfaction and intentions to use the e-learning system. Cidral, Oliveira, Felice and Aparicio (2018) proposed a theoretical model incorporating the updated D&M ISS model (Delone & Mclean, 2003) and a model proposed by researchers in 2008 (Sun, Tsai, Finger, Chen, & Yeh, 2008). Their model has been validated in higher education institutions and university centers in Brazil. The findings suggest that the quality of collaboration, the quality of information and the perceived satisfaction of users are the main factors behind the use of e-learning. While the quality of system, its use and the perceived satisfaction of users explain the individual impact. Similarly, Al-Azawei (2019) used the updated D&M ISS model to investigate the variables affecting the adoption of social networking sites namely Facebook, and LMS, specifically Moodle in higher education in Iraq. The results of the study indicate that four variables: system quality, information quality, technology experience, and Internet experience are direct determinants of technology use and user satisfaction, which in turn affect the net benefits of Facebook and Moodle. This also enhances the effectiveness of applying the D&M ISS model in the case of e-learning.

Self-regulated Learning Theory

Self-regulated learning theory (SRL) defines learning as a dynamic process in which the student plans, monitors and evaluates his or her learning, applying appropriate strategies to achieve the objectives. It is a set of activities that individuals do for themselves in a proactive way (Zimmerman, 2013). According to a recent article on a review of six of the most popular self-regulated learning models (Panadero, 2017), most of them are composed of three phases, namely preparation, performance and evaluation. As the author states, the preparation phase includes task analysis, planning, goal detection and goal achievement. The performance phase involves the performance of the actual task performed while monitoring and controlling progress. The last phase of the assessment, where the student reflects, adjusts and adapts for future performance.

Many researchers have recognized the importance of SRL as a predictor of academic success in e-learning systems, Liaw and Huang (2013) studied learner self-regulation to better understand learners' attitudes towards e-learning. In this study, the authors also proposed a conceptual model for studying learner self-regulation in e-learning environments. The results showed that perceived satisfaction

factors, perceived usefulness and interactive learning environments were defined as predictors of students' self-regulation in e-learning environments. In a study conducted to examine research to integrate formal and informal learning using social media and supporting students' self-regulated learning in a higher education context, Matzat and Vrieling (2016) have shown that, the use of social media as an educational tool has greatly encourage students to control their autonomous learning. A paper presented by Wong, Baars, Dan, Zee, Houben, and Paasa (2019), proposed a systematic review of 35 studies on approaches to support SRL in multiple types of online learning environments. Researchers have identified ways for SRL to effectively guide online learners. The conclusions point out that SRL strategies (better planning, spend more time viewing materials), approaches to support SRL (prompts, feedback, integrated support systems) and human factors (cognitive ability, self-efficacy, achievement levels, gender, prior knowledge) play an essential role in understanding SRL supports in online learning.

E-LEARNER SUCCESS ASSESSMENT MODEL

The background research described in Section 2 presents models, which the researchers believe have proven their effectiveness in online learning environments (Chow & Shi, 2014; Cidral et al., 2018; Estriegana et al., 2019; Matzat & Vrieling, 2016; Mohammadi, 2015; Lin & Wang, 2012; Sun et al., 2008). Models such as TAM and ECM include several factors (such as perceived enjoyment, perceived ease of use, computer anxiety, attitude towards LMS, subjective norm, image and perceived usefulness) which have been identified as having significant effects on student satisfaction and the intention to continue using the e-learning system. However, other factors proposed by the D&M SSI model, such as system quality, service quality, content quality, or even individual factors proposed by the SRL theory, can complement the prediction about student success in online training.

CONCEPTUAL MODEL

In an attempt to answer the fundamental questions that guide our research, as well as to define the determinant of student use, satisfaction and success in e-learning, we propose an e-learner success assessment model (e-LSAM). Based on the exploitation of the recent versions of the models presented in the previous section, by adding some factors have been identified from previous research work, such as social interactions (interactions between the instructor and students and interactions between pairs) (Cigdem, Ozturk, & Topcu 2016; El-Hilali, Al-Jaber, & Hussein, 2015; Matzat & Vrieling, 2016; Panadero, 2017; So & Brush, 2008; Temizer & Turkyilmaz, 2012), course flexibility (Barbera et al., 2013; Deshwal et al., 2017; Masrom, Zainon & Rahiman, 2008; Agrawal & Mittal, 2018) and diversity in assessments (Cidral et al., 2018; Lallemand et al., 2015; Radwan, 2014). Figure 1 shows our conceptual model called e-LSAM.

Our objective is to causally model the factors suspected by previous research, to have a positive effect, directly or indirectly, on student success in online training. The e-LSAM is not specific to an LMS and applies to various online course management systems. It is consisting of 16 factors grouped under 5 dimensions (learner, instructor, system, course and social) indicated by colors as illustrated in Figure 1, and 3 measurable variables, which are learner satisfaction, intention to continue using the system and their success in the same system.

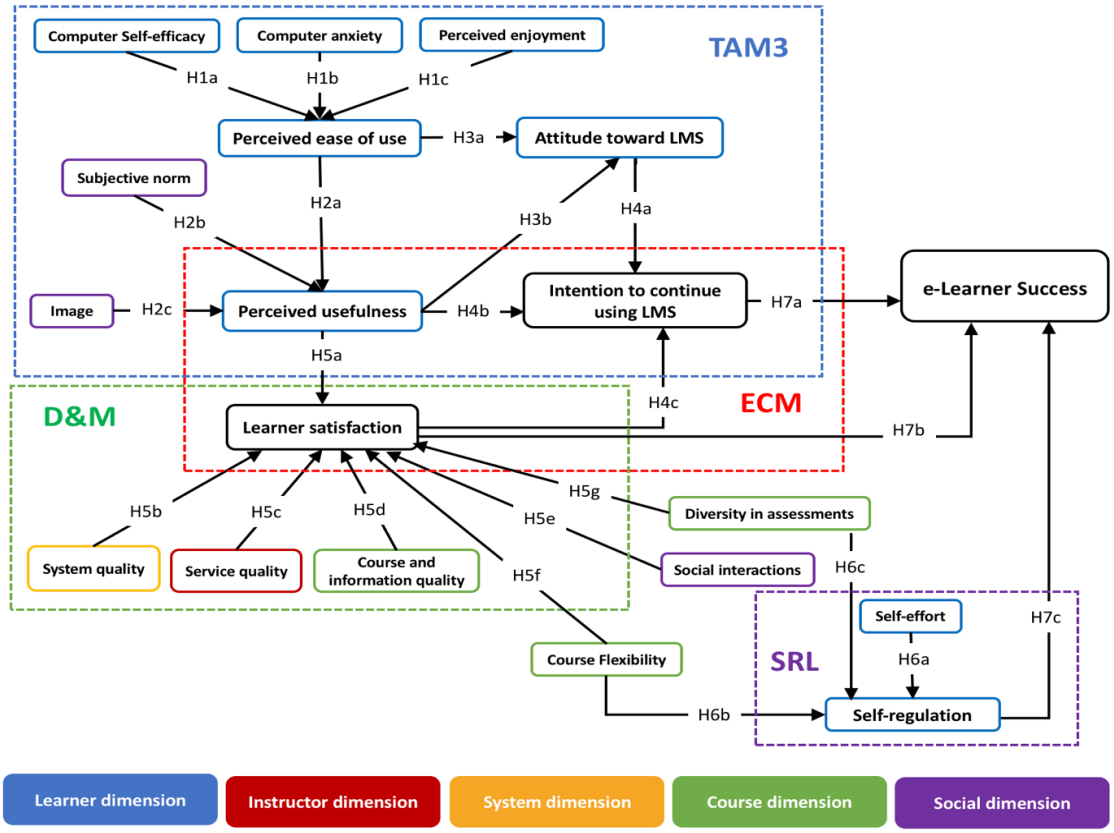

Figure 1: e-LSAM (e-learner success assessment model).

Research Hypotheses

The perceived ease of use of a system is the degree to which a person believes that using a system is easy and will be free of effort. Venkatesh in 2000, suggested that individuals will form early perceptions of the perceived ease of use of a system based on their general beliefs associated with computers and their feelings about computer use (Venkatesh, 2000). The factors suggested by Venkatesh are computer self-efficacy, computer anxiety and perceived enjoyment. Computer self-efficacy is defined as the beliefs of individuals in relation to their control of their individual ability to use a system. Perceived enjoyment represents the intrinsic motivation associated with using the system, it is also the extent to which the activity of using a system is perceived to be enjoyable in its own right. Computer anxiety is defined as the degree of fear, when the person is confronted with the possibility of using a computer.

From previous studies (Chow & Shi, 2014; Estriegana et al., 2019; M.-C. Lee, 2010; Sun et al., 2008; Wook et al., 2015;), perceived ease of use in e-learning could be affected by several anchors related to individual learner characteristics regarding LMS use (including computer anxiety, perceived enjoyment and computer self-efficacy). Furthermore, (Sun et al., 2008) find that computer anxiety has negative impact on perceived ease of use. Therefore, we suggest the following assumptions:

H1a: Perceived ease of use in e-learning will be influenced by computer self-efficacy.

H1b: Perceived ease of use in e-learning will be influenced by computer anxiety.

H1c: Perceived ease of use in e-learning will be influenced by perceived enjoyment.

The perceived usefulness of a system is defined as the extent to which an individual believes that the using particular system would enhance his/her job performance and productivity (Venkatesh &

Davis, 2000). It is one of the independent constructs in the TAM. In TAM2 subjective norm and image are the two determinants of perceived usefulness that represent the social influence processes (Venkatesh & Davis, 2000). According TAM2, subjective norm is the degree to which an individual perceives that people with appreciable opinions think they should or should not use the system (Ajzen & Fishbein, 1975). While, image is the degree of social rank, in which an individual perceives that the use of a system will improve their social status (Moore & Benbasat, 1991). Furthermore, still according TAM2, Davis hypothesized that the perceived ease of use having a direct influence on the perceived usefulness. In e-learning, the perceived usefulness of the task is defined as a student's perception of the importance of performing an activity to achieve a specific goal (Lens, Bouffard, & Vansteemkiste 2006). It is an important factor to understand the motivation of students engaged in online training programs. Based on the findings presented above in the context of e-learning (M.-C. Lee, 2010; Pituch & Lee, 2006; Sun et al., 2008) social influence is an important factor in the decision of individuals to use the LMS. Likewise, the easier it is for learners to interact with the LMS, the more likely they will find the LMS useful. We therefore assume that:

H2a: Perceived ease of use in e-learning will positively influence perceived usefulness.

H2b: Subjective norm will positively influence perceived usefulness.

H2c: Image will positively influence perceived usefulness.

Several studies suggest that the learner's attitude towards e-learning system is an important factor in understanding learners' behavior towards e-learning (Cheng, 2012; Chow & Shi, 2014; M.-C. Lee, 2010; Piccoli, Rami, & Blake, 2007; Sun et al., 2008). TAM describes the attitude towards system as the level at which individuals perceive a positive or negative feeling related to the use of a system (Davis, 1986). In our case the system is LMS, so we define the attitude towards LMS as the impression that a learner has of participating in online learning activities through using the LMS. Instructors publish their material on the LMS, and learners participate through computer networks or internet. A more positive attitude towards LMS, for example, when students do not have a perception for fear of the difficulty of using the platform, and also understand its importance and usefulness, will result in more effective and efficient learners in an e-learning environment. Therefore, this research will test these assumptions:

H3a: The attitude towards LMS will be positively influenced by perceived ease of use.

H3b: The attitude towards LMS will be positively influenced by perceived usefulness.

In marketing the continuance intentions is defined as a specific desire to continue an e-shopping relationship with a service or product provider (Czepiel & Gilmore, 1987). Bhattacherjee was one of the first researchers to propose a model to explain the continuance intentions using the IS (Bhattacherjee, 2001). Using a sample of on-line banking users', he found that the most significant factors was satisfaction and perceived usefulness, which in turn were determined by user confirmation, describing that satisfied users are more likely to continue to use the IS. Davis and Venkatesh also show in TAM, that attitude toward using the system and perceived usefulness were direct determinants of the intention to use the same system (Venkatesh & Davis, 2000).

In the field of e-learning, the intention to continue using LMS is undoubtedly the most important factor to be determined. in his study (M.-C. Lee, 2010), the author synthesized the ECM, the TAM, the flow theory and the theory of planned behavior to predict learners' intentions to continue using e-learning. The results show that learner satisfaction has the most significant effect on learner continuance intention, followed by attitude, perceived usefulness and subjective norm as significant but weaker predictors. Hence, we hypothesize:

H4a: Learners' continuance intentions will be influenced by learners' attitude towards LMS.

H4b: Learners' continuance intentions will be influenced by perceived usefulness.

H4c: Learners' continuance intentions will be influenced by learners' satisfaction.

Whereas customer satisfaction is increasingly capturing the interest of organizations that have realized that the key to success is a set of customer-centric actions, the interest shown in the field of e-learning in the study of satisfaction is also significant. Several studies focused on the detection of factors that contribute to the understanding of user perceived satisfaction of e-learning (Chow & Shi, 2014; Cidral et al., 2018; Liaw & Huang, 2013; Sun et al., 2008). According to these studies, perceived satisfaction could be affected by perceived usefulness in e-learning as well as interactive learning environments. Furthermore, Sun et al. (2008) shows that students who have a high level of collaborative learning are more likely to be satisfied with their distance course than those who had a low level of collaborative learning. Therefore, we assume the following hypotheses:

H5a: Perceived usefulness to the learner positively influences his or her satisfaction

H5e: Learners' satisfaction will be positively influenced by social interaction.

In the literature, the D&M ISS model has been used to measure the degree of user satisfaction with the IS (Delone & Mclean, 2003). In this model, the main producers of satisfaction are service, information and system quality. In the context of e-learning, we can represent the quality of the system as well as the quality of the e-learning platform used (design and ergonomics), the quality of information represents the production of quality courses (well detailed course, clear and concise content, QCM are well designed), while, the quality of service refers to the quality of technical services put in place to answer students' questions, this service is generally provided either by technicians or by instructors. The studies that were conducted on e-learning confirm the proposed relationship by D&M ISS model (Cidral et al., 2018; Mohammadi, 2015; Ozkan & Koseler, 2009). Where LMSs that offer dynamic, interactive learning with high technical services can increase student satisfaction and thus improve their chances of success. We therefore assume that:

H5b: System quality would have a positive effect on learners' satisfaction.

H5c: Service quality would have a positive effect on learners' satisfaction.

H5d: Course and information quality would have a positive effect on learners' satisfaction.

The time and place independence available through LMS allow learners to have a high degree of flexibility in when and where they participate in web based courses (Arbaugh & Duray, 2002). In addition, elimination of physical barriers can attract competent students who would otherwise not be able to pursue their education. Furthermore, with no restrictions on time and space in e-learning, learners must develop a self-regulation described by their ability to organize their individual work as well as their ability to organize the course in order to complete the entire online course program (Liaw & Huang, 2013; Ozkan & Koseler, 2009). Thus, we assume the following:

H5f: Course flexibility has a positive effect on learners' satisfaction.

H6a: Self-effort has an influence on self-regulation.

H6b: Course flexibility has an influence on learners' self-regulation.

Assessment plays an important role in e-learning for both learners and teachers. It provides continuous feedback on the effectiveness of e-learning and identifies those parts of the course where a change in instructional strategy could be recommended. Assessment makes it possible to ensure the progress of the learners' learning and uses learning regulation (Zimmerman, 2013). It also allows teachers to track the results of classroom assessments on the LMS platform to gain valuable information on each learner's participation, progress, success or failure, and performance difficulties.

It is also important to remember that your learners not only have a different educational experience, but also different expectations and needs. That's why you need to create several varieties of questions in your quizzes, such as multiple-choice questions, true/false questions, drag and drop questions, etc. Then use a variety of multimedia elements such as audio, video and visual elements (Liaw & Huang,

2013; Matzat & Vrieling, 2016). With this diversity you can significantly improve learners' satisfaction with your LMS. Thus, we state the hypotheses below:

H5g: Diversity of assessments has a significant effect on learners' satisfaction.

H6c: Diversity of assessments has a significant effect on learners' self-regulation.

Opting for online training means first and foremost focusing on the comfort of being able to choose when and where to learn, at a reduced price and that encourages sharing (asking questions, asking advice, exchanging with other students). Nevertheless, this is not an easy solution. To be successful, you need real discipline and a great personal commitment.

In the last five years, several studies in the field of e-learning were conducted to try to understand the factors that help learners succeed in their online training (Cidral et al., 2018; Estriegana et al., 2019; Liaw & Huang, 2013; Matzat & Vrieling, 2016; Wook et al., 2015). The results clearly indicate that the main factors are continuity of use with learner engagement, as well as a perceived satisfaction with the LMS. For this purpose, we assume in this research that:

H7a: e-Learner success will be influenced by the intentions to continue using LMS.

H7b: e-Learner success will be influenced by the learners' satisfaction.

H7c: e-Learner success will be influenced by the learners' self-regulation.

The Figure 1 mentions all the hypotheses on the links between the different factors.

RESEARCH DESIGN

QUESTIONNAIRE DESIGN

In this field of research, the evaluation of theoretical models is carried out by means of questionnaires. An online survey is designed primarily from prior research and modified according to the context of our research in Morocco (see the Appendix). The questionnaire was offered in French as it is the second most widely spoken language in the country. All the questions in our questionnaire were structured using a Likert scale ranging from 1 as strongly disagree to 5 as strongly agree for the measurement.

The survey instrument is designed into two phases, the first, includes questions on the components of our e-learner success assessment model (e-LSAM), the majority of the questions have been taken from the literature and adapted for e-learning (Bhattacherjee, 2001; Cheng, 2012; Cidral et al., 2018; Delone & Mclean, 2003; Y.-C. Lee, 2006; Liaw & Huang, 2013; Ozkan & Koseler, 2009; Piccoli et al., 2007; Sun et al., 2008; Venkatesh & Bala, 2008). The second phase presents questions with demographic characteristics, such as the age of the students, their gender, their level of computer expertise, their level of education and the average time they spend using the computer.

PARTICIPANTS

This research is based on the Moodle e-leaning system in a public higher education institution in Morocco, where Moodle is widely used in the education sector, particularly in higher education. The survey is posted online over a period of two months to retrieve participants' responses, the participation is voluntary, and the information provided will remain anonymous.

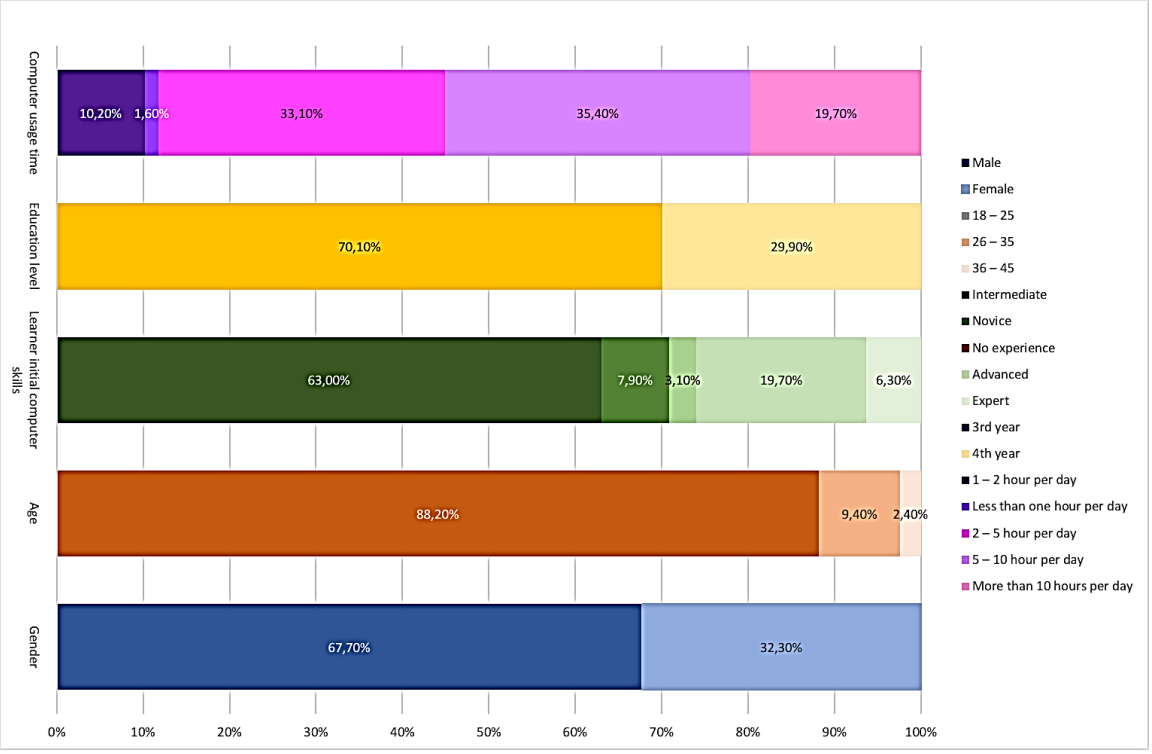

Figure 2: Demographic profile and descriptive statistics of the respondents.

We have configured the online survey to accept only complete responses. 134 responses have been collected from students in two different classes, only 127 of which were accepted as valid. Figure 2 summarizes the demographic profile and descriptive statistics of the respondents.

DATA ANALYSIS

To analyze the data collected in our survey, we conduct a two-phase analysis proposed by Anderson and Gerbing (1988). The e-LSAM model was first examined on SPSS v.23, using confirmatory factor analysis to evaluate reliability as well as convergent and discriminant validities. Then the hypotheses have been conducted based on path analysis using AMOS v.22 software package.

RELIABILITY AND VALIDITY ANALYSIS

As mentioned earlier, the questionnaire has been developed on the basis of previous research and adapted according to the context of our research.

The principal objective is to identify the main factors that reduce the dropout rate in e-learning systems and at the same time, increase the success rate in these same systems. The reliability of each of the nineteen variables and three measurement variables in the e-LSAM model was examined using the Cronbach coefficient. As shown in Table 1, the value of this coefficient varies from 0.703 to 0.862 exceeding the recommended level by 0.7 or more (Hair, Black, Babin, & Anderson, 1998), Cronbach's overall alpha was 0.936.

To ensure adequate composite reliability, the composite reliability value (CR) is calculated. As recommended that by Fornell and Larcker (1994) and Bagozzi (1981), the CR should be equal to or greater than 0.7, with results ranging from 0.709 to 0.849. The second step is to test the convergent validity, the latter can be evaluated on the basis of criteria according to which the estimated coefficient of the indicator was significant in relation to its assumed underlying construction factor (Fornell & Larcker, 1994).

Table 1: Construct validity and convergent validity

Construct	Item	Factor loading (k)	CR	AVE	Cronbach's α
Computer self-efficacy	CSE1	0.723	0.723	0.567	0.719
	CSE2	0.782			
Computer anxiety	CAX1	0.693	0.715	0.558	0.743
	CAX2	0.797			
Perceived enjoyment	PEJ1	0.783	0.721	0.564	0.752
	PEJ2	0.718			
Perceived ease of use	PEU1	0.753	0.818	0.600	0.729
	PEU2	0.804			
	PEU3	0.766			
Attitude toward LMS	ATT1	0.791	0.835	0.628	0.724
	ATT2	0.811			
	ATT3	0.775			
Perceived usefulness	PUS1	0.731	0.832	0.623	0.831
	PUS2	0.819			
	PUS3	0.814			
Self-effort	SEF1	0.806	0.756	0.608	0.722
	SEF2	0.752			
Self-regulation	SRG1	0.862	0.817	0.691	0.862
	SRG2	0.799			
Service quality	SVQ1	0.684	0.731	0.578	0.805
	SVQ2	0.830			
System quality	STQ1	0.699	0.755	0.507	0.703
	STQ2	0.689			
	STQ3	0.746			
Course and information quality	CIQ1	0.872	0.838	0.636	0.733
	CIQ2	0.832			
	CIQ3	0.675			
Course Flexibility	CFX1	0.810	0.728	0.573	0.751
	CFX2	0.700			
Diversity in assessments	DIA1	0.767	0.709	0.549	0.719
	DIA2	0.714			
Social interactions	SIT1	0.804	0.828	0.617	0.763
	SIT2	0.847			
	SIT3	0.698			
Subjective norm	SBN1	0.860	0.849	0.653	0.734
	SBN2	0.787			
	SBN3	0.775			
Image	IMG1	0.823	0.724	0.569	0.798
	IMG2	0.679			
Intention to continue using LMS	ICU1	0.741	0.745	0.594	0.801
	ICU2	0.799			
Learner satisfaction	LST1	0.709	0.801	0.574	0.725
	LST2	0.801			
	LST3	0.760			
e-Learner Success	LSC1	0.801	0.788	0.650	0.788
	LSC2	0.812			

We assess the measurement scales according to the other two criteria, factor loading (k) should be 0.5 or greater, which indicates a well-defined structure, and average variance extracted (AVE) by each construct should exceed the variance due to measurement error for the construct (Segars, 1997). The AVE for each construction should exceed 0.5. As shown in Table 1, the results ranging from 0.507 to 0.691, with factor loadings results ranging from 0,675 to 0.872. showing that, overall, the measurement model has demonstrated adequate convergent validity.

The last step of this first phase is to measure the sensitivity of the measurement scale. For this purpose, the discriminant validity is used to measure the level at which the scale of the different constructions differs from each other. According to researchers (Fornell & Larcker, 1994), discriminant validity is present when the variances shared by a construction and each of the other constructions of the model are all lower than the variance shared by that construction and its own indicators. In this study the discriminant validity is evaluated using the comparison between the correlation values of the items and the square root AVE (Anderson & Gerbing, 1988).

Table 2: Correlation matrix

	CSE	CAX	PEJ	PEU	ATT	PUS	SEF	SRG	SVQ	STQ	CFX	CIQ	DIA	SBN	IMG	SIT	ICU	LST	LSC
CSE	**0.753**																		
CAX	0.133	**0.747**																	
PEJ	0.354	0.326	**0.751**																
PEU	0.548	0.171	0.374	**0.775**															
ATT	0.606	0.247	0.387	0.543	**0.792**														
PUS	0.565	0.189	0.338	0.588	0.748	**0.789**													
SEF	0.401	0.252	0.263	0.409	0.278	0.450	**0.779**												
SRG	0.447	0.216	0.352	0.455	0.390	0.421	0.419	**0.831**											
SVQ	0.357	0.351	0.226	0.347	0.303	0.256	0.259	0.303	**0.761**										
STQ	0.533	0.210	0.465	0.648	0.567	0.494	0.191	0.457	0.448	**0.712**									
CFX	0.352	0.318	0.383	0.521	0.352	0.334	0.310	0.268	0.320	0.501	**0.757**								
CIQ	0.329	0.163	0.551	0.550	0.377	0.343	0.139	0.323	0.344	0.529	0.498	**0.798**							
DIA	0.378	0.375	0.363	0.306	0.443	0.403	0.232	0.374	0.427	0.527	0.444	0.512	**0.741**						
SBN	0.184	0.155	0.043	0.127	0.349	0.223	0.025	0.142	0.242	0.284	0.067	0.161	0.293	**0.808**					
IMG	0.075	0.106	0.147	0.062	0.015	0.084	0.013	0.235	0.239	0.126	0.050	0.046	0.101	0.424	**0.754**				
SIT	0.276	0.051	0.028	0.282	0.296	0.367	0.167	0.262	0.357	0.276	0.207	0.294	0.251	0.350	0.447	**0.785**			
ICU	0.571	0.115	0.443	0.594	0.553	0.544	0.140	0.409	0.421	0.649	0.548	0.611	0.562	0.305	0.236	0.349	**0.771**		
LST	0.395	0.242	0.341	0.437	0.356	0.361	0.214	0.291	0.468	0.558	0.448	0.470	0.560	0.383	0.252	0.492	0.685	**0.758**	
LSC	0.538	0.166	0.428	0.517	0.398	0.519	0.345	0.460	0.402	0.656	0.419	0.481	0.466	0.229	0.284	0.278	0.706	0.632	**0.807**

Note. CSE (Computer self-efficacy), CAX (Computer anxiety), PEJ (Perceived enjoyment), PEU (Perceived ease of use), ATT (Attitude toward LMS), PUS (Perceived usefulness), SEF (Self-effort), SRG (Self-regulation), SVQ (Service quality), STQ (System quality), CFX (Course Flexibility), CIQ (Course and information quality), DIA (Diversity in assessments), SBN (Subjective norm), IMG (Image), SIT (Social interactions), ICU (Intention to continue using LMS), LST (Learner satisfaction), LSC (e-Learner Success)

As shown in Table 2, the correlation matrix is presented, but with the diagonal elements replaced by the square root of the AVE. The square roots of the AVE are greater than the absolute values of the off-diagonal elements of the corresponding rows and columns of the correlation matrix, this suggests that a construction is more strongly correlated with its indicators than with the other constructions of the model, showing good discriminant validity.

Analysis of the Structural Equation Model

After a convergent and discriminant validity of the measurement model proposed in our study, a structural equation model (SEM) approach is used to test the assumptions previously discussed in the e-LSAM model. According to Chumney (2013), SEM represents an overall statistical approach to path analysis using maximum likelihood estimation, allowing to test hypotheses dealing with the relationships between the observed variables and the latent variables. The SEM approach also has the advantage of providing a better visualization of the entire research model rather than the multiple regression approach. The fit of the model can be assessed by examining a set of adjustment indices. In view of the literature (Roussel, Durrieu, Campoy, & El Akremi, 2002; Schreiber et al., 2006;

Schumacker & Lomax, 2004), there are several indices, which are grouped into three categories: absolute fit indices, incremental fit indices and parsimony fit indices.

According to McDonald (McDonald & Ho, 2002), absolute fit indices determine the extent to which an a priori model fits the sample data and demonstrates which proposed model has the highest fit. Included in this category are the chi-squared test (X2), goodness-of-fit statistic (GFI), adjusted goodness-of-fit statistic (AGFI), root mean square error of approximation (RMSEA), and the root mean square residual (RMSR). In our case, X2 was 903.57, with GFI of 0.901 and AGFI of 0.871 (Recommended value $\geq$ 0.9), RMSEA of 0.080 (Recommended value $\leq$ 0.08) and RMSR of 0.098 (Recommended value $\leq$ 0.10). These indices together indicated a good fitness. Incremental fit indices, also known as comparative or relative fit indices, are indices to assess the contribution of the studied model to a basic restrictive model (McDonald & Ho, 2002). These indices compare the estimated model with the reference model with a zero correlation between the observed data (Roussel et al., 2002). Included in this category are the Normed-fit index (NFI) and Comparative fit index (CFI), with recommended values greater than 0.9. NFI of our model was 0.903 and CFI of 0.944. which showed good fit. Parsimony fit indices control the overestimation of the model. The aim is to achieve a better balance between maximizing adjustment and minimizing the number of estimated coefficients (Schumacker & Lomax, 2004). This test can be performed when the value of X2/df (df is degree of freedom) is less than 2 or even 3 (McDonald & Ho, 2002). The value of df was 498 with a value of X2/df of 1.81 less than the recommended value, suggesting that the model is a reasonably good fit to the data.

Table 3: Summary of hypotheses tests

	Hypothesis	β,γ	t-value	p-value	Support
H1a	Computer self-efficacy → Perceived ease of use	0.432	4.147	<0.001	Yes
H1b	Computer anxiety → Perceived ease of use	-0.215	-2.889	<0.001	Yes
H1c	Perceived enjoyment → Perceived ease of use	0.779	6.640	<0.001	Yes
H2a	Perceived ease of use → Perceived usefulness	0.730	9,438	<0.001	Yes
H2b	Subjective norm → Perceived usefulness	0.290	3,204	<0.01	Yes
H2c	Image → Perceived usefulness	0.500	5.742	<0.01	Yes
H3a	Perceived ease of use → Attitude toward LMS	0.083	0,878	0.380	No
H3b	Perceived usefulness → Attitude toward LMS	0.922	9,633	<0.001	Yes
H4a	Attitude toward LMS → Intention to continue using LMS	-3.214	-1.827	0.067	No
H4b	Perceived usefulness → Intention to continue using LMS	3.125	1.886	0.059	No
H4c	Learner satisfaction → Intention to continue using LMS	0.738	13.684	<0.001	Yes
H5a	Perceived usefulness → Learner satisfaction	0.537	6,086	<0.001	Yes
H5b	System quality → Learner satisfaction	0.613	6.791	<0.001	Yes
H5c	Service quality → Learner satisfaction	-0.134	-1.755	0.079	No
H5d	Course and information quality → Learner satisfaction	-0.239	-3,525	<0.001	Yes
H5e	Social interactions → Learner satisfaction	0.385	7.334	<0.001	Yes
H5f	Course Flexibility → Learner satisfaction	0.327	3.946	<0.001	Yes
H5g	Diversity in assessments → Learner satisfaction	0.443	5.454	<0.001	Yes
H6a	Self-effort → Self-regulation	0.437	6.151	<0.001	Yes
H6b	Course Flexibility → Self-regulation	0.483	5.351	<0.001	Yes
H6c	Diversity in assessments → Self-regulation	-0.279	-2.566	<0.05	Yes
H7a	Intention to continue using LMS → e-Learner Success	0.755	5.720	<0.001	Yes
H7b	Learner satisfaction → e-Learner Success	0.056	0.453	0.649	No
H7c	Self-regulation → e-Learner Success	0.241	5.346	<0.001	Yes

The hypotheses of the e-LSAM model are tested using the SEM approach. Table 3 provides the results. The coefficients used to test the assumptions are: The standardized path coefficients (β, γ), this coefficient compares the intensity of the effect of each individual independent variable with that of the dependent variable. As the absolute value of the coefficient increases, so does the greater the effect. The critical ratios (t-values), this coefficient makes it possible to estimate the influence of coincidence on the outcome of the hypothesis. Significance level (p-value), this value represents the probability of making a type 1 error. As the value of p is lower, the probability of making an error in rejecting the null hypothesis is lower. A limit value of 0.05 is often recommended. The variance explained (R2), this is the percentage of the variation of the response variable that is explained by the input

variables. This coefficient has a value between 0 and 1, a value of R2 close to 1 indicates that most of the variation in response data is explained by the different input values.

Figure 3 provides a summary of the hypothesis results of the e-LSAM model. However, only the assumptions previously tested are mentioned.

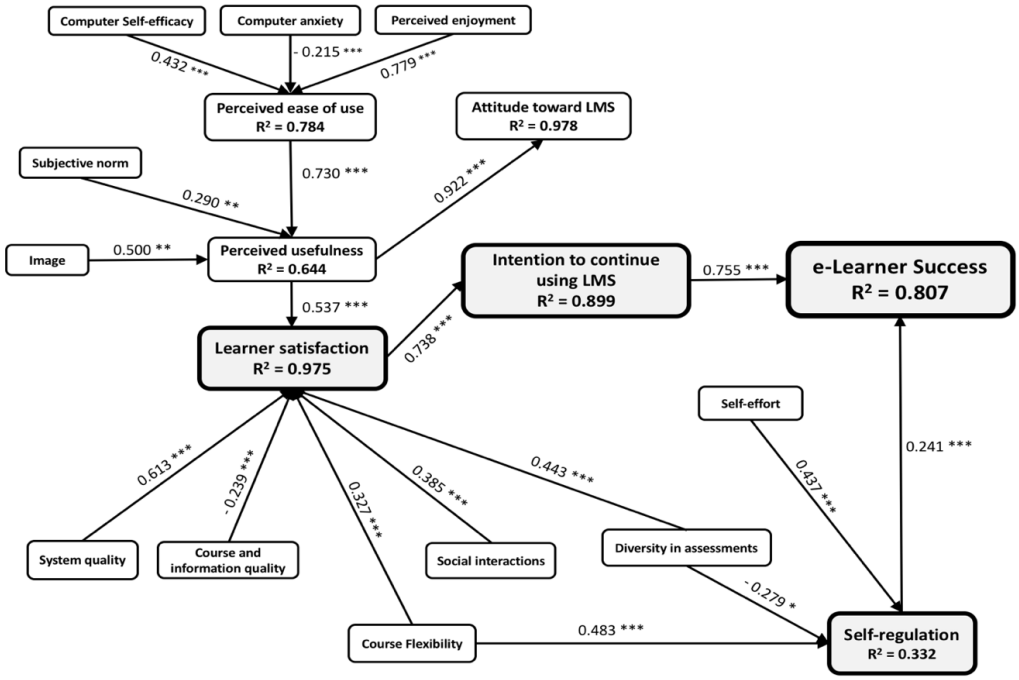

Figure 3: Results of structural model assessment (* p < 0.05, ** p < 0.01, *** p < 0.001)

According (Anderson & Gerbing, 1988), for a hypothesis to be accepted or rejected with a small probability of error (p-value) often 5%, it is necessary to calculate the t-values that make it possible to estimate the influence of chance on the result of the hypothesis. if t-values is greater than 1.96 or less than -1.96, the factor covariance is significant. In this research, sixteen hypotheses were highly significant at $p < 0.001$, two were significant at $p < 0.01$, one hypothesis was slightly significant at $p < 0.05$ and five hypotheses were not significant. The structural analysis of the model explains a total variance (R2) of learner success in e-learning systems of 80.78% explained by the different factors. The model also explains 78.48% of the perceived ease of use, 64.40% of the perceived usefulness, 97.80% of the attitude towards LMS, 97.52% of the learner satisfaction, 33.20% of the self-regulation and 89.94% of the intention to continue using LMS.

HYPOTHESES EXAMINATION

As shown in Table 3, computer self-efficacy ($\beta = 0.432$, $t = 4.147$, $p<0.001$) and perceived enjoyment ($\beta = 0.779$, $t = 6.640$, $p<0.001$) had a positive impact on perceived ease of use. However, computer anxiety factor had a significant negative effect on perceived ease of use ($\beta = -0.215$, $t = -2.889$, $p<0.001$), thus supporting assumptions H1a, H1b and H1c.

Subjective norm ($\beta=0.290$, $t=3.204$, $p<0.01$), Image ($\beta=0.500$, $t=5.742$, $p<0.01$) and perceived ease of use ($\beta=0.730$, $t=9.438$, $p<0.001$) were found to be positively significant factors for determining perceived usefulness. The H2a, H2b and H2c assumptions were therefore confirmed. The perceived ease of use did not have a significant effect on attitude toward LMS ($\beta=0.083$, $t=0.878$), rejecting the H3a hypothesis. While, perceived usefulness had a very significant positive effect on attitude towards LMS ($\beta=0.922$, $t=9.633$, $p<0.001$), thus supporting the H3b hypothesis. Perceived usefulness ($\beta=3.125$, $t=1.886$) and attitude toward LMS ($\beta=-3.214$, $t=-1.827$) were not significant to determine

intention to continue using LMS. While learner satisfaction had a strong positive effect on the intention to continue using LMS (β=0.738, t=13.684, p<0.001). The H4a and H4b hypotheses were rejected, while the H4c hypothesis was therefore confirmed.

Course and information quality (β=-0.239, t=-3.525, p<0.001) had a significant negative effect on learner satisfaction, thus testing the H5d hypothesis. Perceived usefulness (β= 0.537, t=6.086, p<0.001), system quality (β=0.613, t=6.791, p<0.001), social interactions (β=0.385, t=7.334, p<0.001), Course flexibility (β=0.327, t=3.946, p<0.001) and diversity in assessments (β=0.443, t=5.454, p<0.001) all had a positive effect on learner satisfaction, thus confirming the H5a, H5b, H5e, H5f and H5g assumptions.

However, the H5c hypothesis, according to which quality service has a significant effect on learner satisfaction, was rejected (β=-0.134, t=-1.755). Assumptions H6a and H6b, according to which self-effort (β=0.437, t=6.151, p<0.001) and course flexibility (β=0.483, t=5.351, p<0.001) have a positive effect on self-regulation while diversity in assessments (β=-0.279, t=-2.566, p<0.005) has a significant negative impact on self-regulation, which verifies assumption H6c. Finally, the intention to continue using LMS (β=0.755, t=5.720, p<0.001) and self-regulation (β=0.241, t=5.346, p<0.001) both have a significantly positive effect on the e-learner success. In contrast, learner satisfaction had no significant effect on e-learner success (β=0.056, t=0.453). Assumptions H7a and H7c were accepted, while assumption H7b was therefore rejected.

DISCUSSION

The results of this study identify a number of relationships that determine learners' satisfaction, success and intention to continue using the e-learning system. Table 4 summarizes the significant direct, indirect, and total effects between variables in the e-LSAM model.

According to the results, the computer self-efficacy, computer anxiety and perceived enjoyment factors have significant indirect effects on perceived usefulness through the perceived ease of use factor. These results also indicate that the perceived ease of use plays a mediating role in the relationship between each of these three variables and perceived usefulness, which is consistent with the results of previous studies (Chow & Shi, 2014; Estriegana et al., 2019; Sun et al., 2008; M.-C. Lee, 2010; Wook et al., 2015). Likewise, perceived usefulness and ease of use play a mediating role between the five factors: computer self-efficacy, computer anxiety, perceived enjoyment, subjective norm and image, and the two variables learner satisfaction and attitude towards LMS.

Table 4: Direct, indirect and total effects between variables in the e-LSAM

Path			Effects		
			Direct	Indirect	Total
Computer self-efficacy	→	Perceived ease of use	0.432	-	0.432
Computer anxiety			-0.215	-	-0.215
Perceived enjoyment			0.779	-	0.779
Image	→	Perceived usefulness	0.500	-	0.500
Subjective norm			0.290	-	0.290
Perceived ease of use			0.730	-	0.730
Computer self-efficacy			-	0.315	0.315
Computer anxiety			-	-0.105	-0.105
Perceived enjoyment			-	0.569	0.569
Diversity in assessments	→	Learner satisfaction	0.443	-	0.443
Course Flexibility			0.327	-	0.327
Social interactions			0,385	-	0,385
Course and information quality			-0.239	-	-0.239
System quality			0.613	-	0.613
Perceived usefulness			0.537	-	0.537
Image			-	0.116	0.116
Subjective norm			-	0.156	0.156
Computer self-efficacy			-	0.169	0.169
Computer anxiety			-	-0.196	-0.196
Perceived enjoyment			-	0.306	0.306
Perceived ease of use			-	0.393	0.393

Path			Effects		
			Direct	Indirect	Total
Perceived usefulness	→	Attitude toward LMS	0.922	-	0.922
Image			-	0.198	0.198
Subjective norm			-	0.267	0.267
Computer self-efficacy			-	0.327	0.327
Computer anxiety			-	-0.178	-0.178
Perceived enjoyment			-	0.590	0.590
Perceived ease of use			0.083	0.674	0.757
Diversity in assessments	→	Self-regulation	-0.279	-	-0.279
Course Flexibility			0.483	-	0.483
Self-effort			0.473	-	0.473
Learner satisfaction	→	Intention to continue using LMS	0.738	-	0.738
Diversity in assessments			-	0.326	0.326
Course Flexibility			-	0.241	0.241
Social interactions			-	0.284	0.284
Course and information quality			-	-0.176	-0.176
System quality			-	0.453	0.453
Perceived ease of use			-	0.440	0.440
Image			-	0.051	0.051
Subjective norm			-	0,068	0,068
Computer self-efficacy			-	0.014	0.014
Computer anxiety			-	-0.017	-0.017
Perceived enjoyment			-	0.026	0.026
Intention to continue using LMS	→	e-Learner Success	0.755	-	0.755
Self-regulation			0.241	-	0.241
Diversity in assessments			-	0.204	0.204
Course Flexibility			-	0.317	0.317
Social interactions			-	0.236	0.236
Self-effort			-	0.105	0.105
Course and information quality			-	-0,146	-0,146
System quality			-	0.376	0.376
Image			-	0.044	0.044
Subjective norm			-	0.060	0.060
Computer self-efficacy			-	0.020	0.020
Computer anxiety			-	-0.023	-0.023
Perceived enjoyment			-	0.036	0.036
Perceived ease of use			-	0.047	0.047
Perceived usefulness			-	0.208	0.208
Learner satisfaction			0.056	0.557	0.613

The diversity in assessments, course flexibility, social interactions, course and information quality, system quality and perceived ease of use factors had indirect effects on the intention to continue using LMS through learner satisfaction. Therefore, it can be concluded that the learner satisfaction factor plays a mediating role in the relationship between these variables and the intention to continue using LMS. This also consistent with previous studies (Chow & Shi, 2014; Cidral et al., 2018; Liaw & Huang, 2013; Matzat & Vrieling, 2016; Ozkan & Koseler, 2009).

Against all expectations, the results of the analysis do not support the hypothesis that the learner satisfaction factor positively influences the e-learner success. However, it is interesting to note that this study supports the indirect effect of learner satisfaction on the e-Learner success. This seems to indicate that 80.7% of e-Learner success is explained by self-regulation and the intention to continue using LMS, which plays a mediating role in the relationship with learner satisfaction.

Additionally, it is interesting to conclude from the results of the analysis in the Moroccan context that the attitude towards LMS is not an intermediate variable, and the hypothesis that the attitude towards LMS has a positive effect on the intention to continue using LMS has been rejected. Therefore, this variable has no effect on our model, and therefore can be overridden.

Finally, the results of this study have got some implications as well. To increase learner satisfaction with the e-learning system, the quality of courses and their content should be reviewed to create a rich, interactive and enjoyable course, with a diversity of assessments, such as multiple-choice questions, true/false questions, drag & drop questions, etc. Because, the higher the quality of the content with diversified assessments, the more interested, curious and eager the student will be to learn. Not

to mention, to create an interactive and collaborative learning environment, since a smooth exchange between student and teacher or between pairs is very important for the smooth running of the class.

Similarly, to increase the intention to continue using LMS, teachers are called for explain to students the impact that the LMS platform has on their productivity and therefore their performance in their academic pathways. This may offer a better return on investment, as students are more productive in class and spend less time than in traditional classroom training. All this is intended to boost students to focus on the skills that need to be improved in order to succeed in their training.

CONCLUSION AND FUTURE WORK

In this study, the objective is to identify the success factors associated with e-learning and to examine what factors explain the intention to continue using LMS, learner satisfaction and success in an e-learning system. Once identified, these factors contribute to the knowledge bases for improving the effectiveness of e-learning in Morocco.

The present research proposes a model based on several theories that have proven their effectiveness in the field of e-learning, namely the expectation-confirmation model (ECM), the technology acceptance model (TAM), the DeLone and McLean information success systems model (D&M ISS) or the self-regulated learning theory (SRL). We have named this model the e-Learner success assessment model (e-LSAM). A structural equation model (SEM) approach is used to test the assumptions previously discussed in the e-LSAM model. On the basis of the analysis results, two factors have been identified by participants as the main factors predicting student success in an e-learning system, namely intention to continue using LMS and self-regulation. The latter have also been explained by other factors, such as: learner satisfaction, learner effort, course flexibility, diversity in assessments system quality, course and information quality, perceived usefulness and social interactions.

Although this study provides an overview of the factors that help to understand learner's success in an eLearning system; it is not without limitations. Our research did not take into account the effects of demographic attributes such as gender, age, level of education and others. More specifically, Morocco, like any other country, has its own traditions and culture, it would therefore be more useful to explore how these aspects influence the success of learners in an e-learning system, which is worth considering in future research.

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The survey instrument has been completed on the website, but only the French version is currently available. the access link is as follows: https://www.safsouf.net/sondage/

APPENDIX: E-LSAM QUESTIONNAIRE SURVEY AND SOURCES

Items	Question-naire items	Questionnaire contents	Pertinent literature
Computer self-efficacy	CSE1	I feel comfortable with online learning environments	(Liaw & Huang, 2013; Venkatesh & Bala, 2008)
	CSE2	I am more effective in my learning when I use the e-learning system	
Computer anxiety	CAX1	Working on a computer makes me uncomfortable and stressed	(Sun et al., 2008; Venkatesh & Bala, 2008)
	CAX2	Using the learning system makes me uncomfortable and stressed	
Perceived enjoyment	PEJ1	I enjoy using the e-learning system	(Liaw & Huang, 2013; Venkatesh & Bala, 2008)
	PEJ2	I find it entertaining to use an e-learning system	
Perceived ease of use	PEU1	I find the e-learning system easy to use	(Sun et al., 2008; Y.-C. Lee, 2006)
	PEU2	The interaction with the e-learning system does not require much mental effort	
	PEU3	The e-learning system provides all the required features that make my learning task easy	
Perceived usefulness	PUS1	The use of online education is useful for teaching purposes	(Liaw & Huang, 2013; Y.-C. Lee, 2008)
	PUS2	The e-learning system has been useful to me in increasing my productivity	
	PUS3	Using the e-learning system would allow me to learn quickly	
Attitude toward LMS	ATT1	The use of the e-learning system is a good idea.	(Piccoli et al., 2007; Cheng, 2012)
	ATT2	The e-learning system has improved my motivation	
	ATT3	The e-learning system provides an attractive learning environment	
Self-effort	SEF1	Making a little effort has helped me to succeed in my online training	
	SEF2	Making an effort is very important to progress well	
Self-regulation	SRG1	Setting goals has helped me to succeed in my online training	(Ozkan & Koseler, 2009)
	SRG2	In my training, I am self-regulated and find it easy to take time for reading and homework.	
Service quality	SVQ1	The instructor's intervention is clear and direct	(Urbach, Smolnik, & Riempp, 2010; Delone & Mclean, 2003)
	SVQ2	The instructor is always ready to help me whenever i need it	
System quality	STQ1	The e-learning system is well organized	(Cidral et al., 2018; Ozkan & Koseler, 2009; Delone & Mclean, 2003)
	STQ2	I can easily find the required information on the e-learning system	
	STQ3	The e-learning system includes all the features I need for my learning (Text, figures, audio and video)	
Course and information quality	CIQ1	The courses offered by the e-learning system are rich in quantity	(Delone & Mclean, 2003)
	CIQ2	The courses offered by the e-learning system are rich in quality	
	CIQ3	The courses offered by the e-learning system are always updated	
Course Flexibility	CFX1	The courses offered by the e-learning system are available anytime.	(Ozkan & Koseler, 2009)
	CFX2	The courses offered by the e-learning system are available anywhere.	
Diversity in assessments	DIA1	The e-learning system offers me different ways to evaluate my learning (quiz, written work or work to be done, etc.)	(Sun et al., 2008)
	DIA2	The diversity of assessment allows me to achieve more results	

Subjective norm	SBN1	People who are important to me (family members, teachers or friends) think that I should use the e-learning system	(Venkatesh & Bala, 2008)
	SBN2	People whose opinion I value think I should use the e-learning system	
	SBN3	People who are important to me supports my use of e-learning system	
Image	IMG1	People around me who use the e-learning system have more prestige than those who do not.	(Venkatesh & Bala, 2008)
	IMG2	Use of e-learning system has improved my social status	
Social interactions	SIT1	The e-learning system gives me the opportunity to interact with my classmates	(Sun et al., 2008; Pituch & Lee, 2006)
	SIT2	The e-learning system gives me the opportunity to interact with my instructor	
	SIT3	Communication tools in the e-learning system are efficient (chat room, email, etc.)	
Intention to continue using LMS	ICU1	I recommend others to use e-learning systems	(Bhattacherjee, 2001)
	ICU2	The online learning experience encouraged me to take a new course	
Learner satisfaction	LST1	I am satisfied with my decision to take this e-learning course	(Sun et al., 2008; Delone & Mclean, 2003)
	LST2	I am satisfied with the performance of the e-learning system	
	LST3	I look forward to the experience of using the e-learning system	
e-Learner Success	LSC1	Taking the e-learning course has contributed to the success of my online training	
	LSC2	The learning system has helped me to succeed	

BIOGRAPHIES

Yassine Safsouf is a doctoral student and teacher of computer science in a higher institute of engineering and management in Morocco (ISGA Marrakech), he is also head of the IT department in the same institute. He undertook his PhD in Computer Science at the University of Bretagne Sud, France. His area of research focuses on e-Learning and its applications in higher education. Yassine's research aims to enhance learner success and experience in an e-learning system.

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