E-Learning Success Model

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Contributor: Ibrahim Elshaer

The world has seen an essential development in higher educational institutions (HEI) with the rapid growth of information and communication technologies (ICT) and of computer software. This growth has created an unprecedented revolution in learning or teaching strategies, precisely in distance education. New concepts have received attention, such as e-learning (EL) or online learning, and blended learning (or hybrid learning), which combines face-to-face learning and EL. Hence, EL has become extensively used in HEI and has, for several years, been seen as one of the most important systems for education improvement in some countries.

Keywords: e-learning

1. Introduction

In recent years, the world has seen an essential development in higher educational institutions (HEI) with the rapid growth of information and communication technologies (ICT) and of computer software [1]. This growth has created an unprecedented revolution in learning or teaching strategies, precisely in distance education. New concepts have received attention, such as e-learning (EL) or online learning, and blended learning (or hybrid learning), which combines face-to-face learning and EL. Hence, EL has become extensively used in HEI and has, for several years, been seen as one of the most important systems for education improvement in some countries. For example, according to [2], in the USA in 2000–2001, 90% of public HEI for the short cycle and 89% of public HEI for the long cycle offered distance education, with enrolments of 47.84% (1,472,000) and 30.71% (945,000), respectively, out of a total enrolment of 3,077,000. In the UK, EL has been adopted by 95% of all HEI [3]. The budget for EL in India increased from $2 billion to $5.7 billion between 2016 and 2020 [4].

2. E-Learning Effectiveness

The increase in the adoption of EL in HEI has been followed by higher failure rates of many e-learning systems (ELS) [5]. This has led researchers to investigate the success and failure of EL [6][5][7]. Some reasons for failure are content, comfort level with technology, as well as availability of technical support [8], gaps in terms of three dimensions (ethical, evaluation, and management) [9], effective planning of ELS and a lack of experience [10]. On the other side, the key factors for the successful implementation of ELS are the presence of a culture favorable to EL among students [11], computer literacy, availability of appropriate technology, accessibility, and having a good high bandwidth internet connection [12][13].

The e-learning effectiveness (ELE) concept is complex and multidimensional [1][2][14][15]. Despite this, many studies have attempted to examine the antecedents of ELE [16][17][18]; they did not introduce a comprehensive model for the antecedents of ELE. However, the results of these studies have not always been consistent [19][20] and, therefore, ELE antecedents remain unidentified. Thus, this research helped in filling this gap by introducing a comprehensive framework for the antecedents of ELE in higher education institutions during the COVID-19 pandemic in the KSA context. This framework has been adopted from different fields of research, such as management information systems, pedagogy, education, and psychology [21]. From this perspective, the systemic approach to EL could help to analyze and explain the effectiveness of EL as a dynamic set of interdependent sub-entities interacting together. Based on an inventory of a considerable number of models of ELSS, [4] suggests two dimensions to measure the effectiveness of ELS: net benefits (NB) and user satisfaction (US). NB involves the impacts of ELS, such as academic achievement, empowerment, learning enhancement, and time savings. US is the positive or negative responsiveness of a user toward the skills accumulated or knowledge enhancement through ELS.

3. The Key Antecedents of E-Learning Effectiveness

As such, to better understand the adoption of EL, it is important to examine the relevant factors influencing its effectiveness. The factors affecting the effectiveness of EL are several and various because researchers have regarded these factors in terms of student perceptions, pedagogical aspects, EL environment, technological support, societal factors. According to [22], these factors assimilated to challenges are course, characteristics of students or teachers, context (societal, cultural, and organizational), and technology. For other researchers, these factors were, namely, infrastructure, support of the system, e-learning readiness (ELR), learning culture, design system, resistance to change (RTC), and interactivity (INTRVAY) [15][23][24][25][26]. However, the problem with this research is related to the large number of variables that had a potential impact on ELE. To deal with this problem, it need to focused on the variables most used by recent research (**Table 1**). Based on these 20 studies, it appears that effective ELS depends on the interactions with four variables: ELS, ELR, INTRVAY, and RTC.

Table 1. Antecedents of ELE.

Source	ELS	ELR	INTRVAY	RTC	ELE
[27]	*				*
[17]					*
[28]		*			*
[20]	*				*
[29]		*			*
[16]					*
[30]					*
[20]					*
[26]	*			*	
[31]	*				
[32]			*		*
[4]	*				*
[33]	*				*
[34]	*				
[35]	*				*
[36]	*		*		*
[37]	*			*	
[38]	*				*
[14]	*				*
[39]				*	*

*: Antecedents of E-learning studied; ELS: E-learning System; ELR: E-learning Readiness; INTRVAY: Interactivity; RTC: Resistance to Change; ELE: E-learning Readiness.

3.1. E-Learning System

Over the past two decades, it is evident that ICT has reshaped social life [40]. This evolution has affected the context of traditional education, which has undergone profound changes with the emergence of EL as an extension of traditional learning (face to face). It has been adopted by various HEI as an important part of learning. Because ICT is a main component of EL, it had several nominations, such as EL, network learning, distance learning, e-teaching, online learning, technology-mediated learning, virtual learning, distance education, web-based learning and distributed learning [41]; therefore, no generally accepted definition is available [42][43]. Previous scholars have defined EL as the use of a variety of electronic media to deliver learning to learners, including the interactive TV, intranet, satellite broadcast, extranet, and

internet [1][42][43]. However, these visions are very reductive, since they limit the scope of the concept to a single technological component, while forgetting other basic components.

According to [44], EL is an outcome of combining theories of permanent learning and adult education. It will depend basically on adult learning theory and online collaborative learning theory to develop and build a comprehensive model for effective ELS in HEI. Regarding adult learning theory, [45] mentioned that "*it is focused mainly on how adults learn*". He added that learning theory is built on five dimensions: motivation to learn, adult learner experience, orientation of learning, self-concept, and readiness to learn. Online collaborative learning (OCL) "*focuses on the facilities of the Internet to provide learning environments that foster collaboration and knowledge building*" [46]. Reference [47] defined OCL as: "*a new theory of learning that focuses on collaborative learning, knowledge building, and internet use as a means to reshape formal, non-formal, and informal education for the knowledge age.*" According to [48], EL builds mainly on the interaction between learning theories and ICT. It is networked, delivered via a computer using internet technology and goes beyond the classical paradigms of learning. It brings together critical thinking, organizational and analytical skills, oral and written communication, problem-solving skills, initiative-taking, and interaction with classmates and instructors. In a similar statement delivered by [49], EL was defined as "*the use of electronic media and information and communication technologies in education*". From these definitions, EL goes beyond the simple use of a technological tool and goes beyond being the "*Use of internet technology for the creation, management, making available, security, selection and use of educational content to store information about those who learn and to monitor those who learn, and to make communication and cooperation possible*" [50].

Educational leaders in the United States, such as [51], explain that, if universities do not change radically from traditional learning to EL, they will cease to exist in the twenty-first century. That is why, in recent years, the integration of EL at the university around the world has become necessary, even urgent. As a strategic choice, [52] explains that external and internal factors encourage the development and implementation of EL in institutions' academics. Indeed, the introduction of EL leads to the emergence of strategic challenges. Reference [19] lists ten challenges: hierarchical, organizational, managerial, legal, technical expertise, psychological, staff development, role of teachers, administrative and technical staff, student support, and funding. These different challenges assume that the implementation of EL at the university requires, a priori, a well-established planning phase.

Based on extant literature synthesis and validation, [4] carried out an extensive inventory of models of ELSS and came up with three dimensions of ELS that are validated empirically: service quality (SvQ), system quality (SyQ), information quality (IQ). SvQ involves instructor-student interactions on attributes such as promptness, availability, competency, fairness, and responsiveness. SyQ focuses on the characteristics of the website or an EL portal such as responsiveness, stability, user-friendliness, security, and ease of use. IQ is defined as the quality of content on aspects such as organization, presentation, length, and clarity.

3.2. E-Learning Readiness

A considerable number of studies have considered ELR as a critical factor for the success of ELS [24][28][29]. The implementation of ELS can be preceded by measuring the level of ELR that allows institutions to shape a system adapted to the expected results in order to be a successful implementation. In fact, success in ELS depends on three pillars: the efforts of the educational institutions, those of the instructors, and student background. Understanding the components of this concept and discussing the theory of ELR makes it much easier to understand its impact on the success of ELS.

ELR is broadly defined as "The preparedness of the students to fully explore and exploit the learning opportunities provided by ICT and its related learning technologies, and, ultimately, to maximally draw the attendant benefits in terms of students' academic achievements, reduced dropout rates, social connectivism and for lifelong learning" [53]. Simply, ELR is "those factors that must be accomplished before EL implementation can be regarded as being successful" [54]. This preparedness encompasses two main components, namely, computer technology and the process that learners go through. According to previous research related to ELR, these two components can be broken down into several aspects: students behavior, and student attitudes [55]; policy, technology, financial, human resources, infrastructures [56]; skills, and attitudes [57]; learner characteristics, behavioral engagement technology capabilities, student behavior, emotional engagement, student self-direction, cognitive engagement, student attitude [58]; skill, attitude, experience, organizational barrier, motivation [59].

These multiple aspects are integrated in a synthetic way by [60] by defining ELR under the following aspects: online communication self-efficacy (OCS), computer and internet self-efficacy (CIS), learner control (LC), motivation for learning (MFL), and self-directed learning (SDL). SDL means that the student is able to learn independently. He is able to take the initiative to understand his learning needs, set his learning objectives, identify and allocate his resources for learning, as

well as to choose and apply appropriate learning strategies, and evaluate his learning results. MFL refers to the students' enthusiasm and self-drive to participate in EL. It directs students' efforts towards their own desires and to improve their learning, recovery, and retention. LC is related to the ability of the student to know how to learn as he makes learning decisions and considers experimental results of those decisions. CIS is related to the availability of computer devices and internet access and the ability of students to use them. Since EL is delivered via networks, it is necessary that all assessments be linked. OCS involves computer-mediated communication between students and between them and instructors.

3.3. Interactivity

According to [23], interactivity (INTRVAY) is defined as "open operational interventions planning, problematized, that pushes the learner to find solutions based on what the previous knowledge suggests". In traditional learning, INTRVAY is a fundamental tool to acquire knowledge [61], the heart of learning systems [62][63], and a natural attribute of face-to-face conversation [64]. In the context of ELS, INTRVAY, according to many studies, plays a vital role and has been gaining increasing interest as one of the buzzwords of the discussion on learning systems [65]. This evolution is due to the fundamental changes related to the move from teacher–student dependence design to a teacher–student independence design. In this independent design, INTRVAY takes four shapes: student–system, student–instructor, student–student, and student–content [63].

Student–content (StC) (cognitive presence) refers to how interactively the student can access the knowledge presented and accommodate it into his existing cognitive structure. Student–instructor (StI) (teaching presence) refers to how interactively the instructor delivers the content and the skills required for the student to access the content, by presenting, clarifying information, supporting, encouraging, evaluating, and providing feedback. student–student (StSt) (social presence) is related to the extent through which the students interact with their peers in order to exchange knowledge through communication. Student–system (StSy) refers to interactions not only between students and the interface of EL, but also between students and the other components of the system, which contains all the information that the users are trying the access. Having technological infrastructure alone is not enough to make EL successful [66]. Students need to control the interface tools to access the content, such as buttons, hyperlinks, and menus. Further, they need to interact with the other participants of the system, i.e., the teacher and other students, in many forms, such as quizzes, forums, online chats, video-conferencing and emails.

These four types of INTRVAY have been proven to have a positive effect on EL at several levels: effective student learning [67], increase in the level and speed of student learning [68], increase in learning enjoyment level [69], improvement of student motivation and confidence [70], improvement of student control, and persistence [40], strong student, satisfaction by student–content, and student–system interactions [71], engagement, communication, conversation, and control [72], strong student attention [73], generation of more information, more effective learning process, and more motivated students [74], concentration of ELS on the students [75]. On the other side, in contrast to the above advantages, INTRVAY in EL has some disadvantages: absence of vital personal interactions, not only between students and instructors but also among student colleagues [76].

3.4. Resistance to Change

One of the foundational challenges for the implementation of ELS to be a success is RTC [77][78][79]. It presents a challenge, as the brand-new system is still changing routines and behaviors, which are not accepted by a number of users (teachers, students, and administrators), thereby, producing RTC [80]. Previous ICT studies have shown that RTC is strongly related to the acceptance and use of new ICT [81]. This challenge becomes more serious when the change is surprising without any prior planning, such as the case of the COVID-19 pandemic [79].

Researchers identify several organizational problems of integration, use, development of ICT in education [77][78][80], work practices, underestimation, lack of follow-up, lack of awareness, user dissatisfaction with new systems, negative attitudes towards ICT, culture, lack of systemic approach to implementation, mismatches between technologies and the context, high rates of system non-completion, technical end-user support, lack of user training, and lack of administration. Other researchers explain RTC by six reasons related to the individual's personality [82], such asthat individuals do not want to lose control of their own situation, which creates uncertainty and resistance in them (reluctance to lose control); dogmatic and fairly closed-minded individuals are reluctant to adapt to new situations (cognitive rigidity); efforts to change create a higher level of stress, and personal resilience reduces the ability to cope with these changes (lack of psychological resilience); individuals might resist change due to the increased workload and stress during the change (intolerance of the adjustment period involved in the change); adaptive individuals like familiarity and stick to the current framework, while innovative individuals look for new ideas and want to get out of the current framework (preferences for low levels of

stimulation and novelty); individuals in a new situation may feel new stimuli and their normal response may be inappropriate in the new situation. This could lead to stress due to the misfit (reluctance to give up old habits).

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