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## **Author contact details**

Title and full name: Dr Ibrahim Mutambik  
Department/Group, etc: Information Science, College of Arts  
Institution: King Saud University  
Postal address/PO Box: King Saud University  
City: Riyadh  
State/Region: Riyadh  
Postcode: P.BOX 145111 ZIP 4545  
Country: Saudi Arabia  
Email: imutambik@ksu.edu.sa

Title and full name: Professor John Lee  
Department/Group, etc: School of Informatics  
Institution: University of Edinburgh  
Postal address/PO Box: Informatics Forum, 10 Crichton St.  
City: Edinburgh  
State/Region: Scotland  
Postcode: EH8 9AB  
Country: United Kingdom  
Email: J.Lee@ed.ac.uk

Title and full name: Dr Abdullah Almuqrin  
Department/Group, etc: Vice Dean - Deanship of Library Affairs & Faculty of  
Department of Information Science, College of Arts  
Institution: King Saud University  
Postal address/PO Box: King Saud University  
City: Riyadh  
State/Region: Riyadh  
Postcode: P.BOX 2456 ZIP 11451  
Country: Saudi Arabia  
Email: aalmogren@ksu.edu.sa

# **Role of gender and social context in readiness for e-learning in Saudi high schools**

Ibrahim Mutambik<sup>a\*</sup>, John Lee<sup>b</sup>, and Abdullah Almuqrin<sup>a</sup>

*<sup>a</sup>Department of Information Science, College of Arts, King Saud University, Saudi Arabia; <sup>b</sup>School of Informatics, The University of Edinburgh, United Kingdom*

There is limited evidence of the effects of culture and context on student readiness for e-learning, and how these might interact with gender. This study addresses this gap by studying the effect of culture and context on the readiness of high school students to use e-learning in a unique setting: an education system in which male and female students are educated separately. A mixed methods research approach was adopted because of our emphasis on the subjective aspect of the concept of readiness. Findings demonstrate that there are clear differences between the genders, but that these must be interpreted carefully in this cultural setting. There is scope for further research that investigates this gender divide in other e-learning contexts, including those where male and female students learn together and those where other cultural factors may influence student readiness to use e-learning.

Keywords: e-learning; e-learning readiness; gender; context

## **Introduction**

Although many studies have investigated the role of gender in the adoption of information technology in schools and universities, it can be argued that the role of gender seems to be far from straightforward. As Zhou and Xu (2007) and Henderikx et al. (2019) noted, some show that males are more adopting of information technology, while others suggest the contrary view or find no gender differences. For instance, Padilla-Meléndez et al. (2013) have found gender differences in technology acceptance

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\* Corresponding author. Email: imutambik@ksu.edu.sa

among university students, particularly in attitude, playfulness, and intention to use. Papastergiou and Solomonidou (2005) have also reported gender differences between Greek high school male and female students, and that males use the Internet for entertainment activities and web page creation more than females do. Furthermore, Sánchez-Franco (2006) has highlighted gender differences with respect to “web acceptance and usage” (p. 19), regarding flow, ease of use, and usefulness. In particular, it has been noted that males’ usage decisions are more likely to be significantly influenced by their perception of the usefulness of the technology, while females are significantly influenced by their own perceptions toward technology (Kim et al., 2010; Ong & Lai, 2006). For example, both genders have been found to be more likely to approach computer based assessment (CBA) similarly if it is “playful and its content is clear and relevant to the course,” with male students being mostly motivated by the perceived usefulness of CBA and female students by the ease of use of CBA (Terzis & Economides, 2011, p. 2108).

It can therefore appear that gender responses to the adoption of information technology so far seem to be distinct. However, some have argued that the effect of gender is dying out in technology readiness (So & Swatman, 2006; Tsai & Lin, 2004), while there is also evidence that these effects vary considerably between cultural as well as historical contexts (Richter & Zelenkauskaitė, 2014), while in other cases there is no evidence of an effect (Gay, 2018; Geng et al., 2019). We propose that those who seek a general answer to the question “What is the role of gender in the adoption of information technology?” are misguided. In our research, we raised the question “What is the interaction between cultural context and gender in responses to information technology?”

Our study was located in Saudi Arabia, and we focussed on the introduction of learning technology into high schools. In such a situation, the readiness of users (here, students and teachers) to adopt the technology is commonly seen as a key issue. Specifically in reference to the question of readiness for e-learning, Hung et al. (2010) have argued that gender's role has been insufficiently explored and needs to be more systematically examined. Hung (2016) also pointed out that there is a lack of research that deeply explores gender and e-learning readiness, underscoring the need for finer grained research in this area to explain gender differences more explicitly. We hypothesized that such differences are associated with factors that are not purely personal to individuals. Factors such as individual attitudes, motivation, and comfort with e-learning are emphasized in existing research: we term these *personal factors*, but we want to point to the importance of factors such as social support and access to computing equipment, which are external to the individual. All of the factors, but perhaps especially the *external factors*, may be subject to influences of the cultural context. These influences should be expected to reflect salient aspects of the culture, relating to matters such as gender. Hence, gender effects may be strongly moderated by cultural context.

We define the dimensions of readiness for e-learning as the factors that students consider as a function of their readiness. These dimensions are explored systematically from the students' perspectives. This means we are dealing with what we might call the subjective readiness of students for e-learning. There may be ways in which the students are more, or less, fully prepared than they actually feel, but we have no data with which to assess this. The position is somewhat analogous to the way that self-efficacy is not the same thing as efficacy per se (objective ability in some task, for instance). Subjective readiness, moreover, concerns an anticipation of the future: students are not

yet using e-learning; they may or may not correctly understand what exactly it involves. Most of the e-learning readiness literature really concerns subjective readiness, and we believe it is important that this be explicitly recognized. We share, of course, the assumption that subjective readiness is an important indicator, and to some degree a determinant, of how well a student is prepared to cope with the reality of working with e-learning, but it is useful to be clear that this is generally an assumption and that the relationship is often obscure. Cultural context may affect gender differences in subjective readiness differently from how it affects gender differences in readiness *per se*, but we propose it is very likely that it affects both. Our general idea is that cultural context, working especially through the external factors, may have important differential effects on the subjective readiness for e-learning of males and females. Hence, our study aimed to systematically examine the following research questions:

- Q1. What are the factors that influence subjective readiness for e-learning?
- Q2. What are the external factors affecting subjective readiness for e-learning?
- Q3. Will the effect of the external factors on subjective readiness for e-learning differ between male and female students?

In this paper, we reflect on how the answer to Q3 depends on the embedding of the external factors within the cultural context. In Saudi Arabia, cultural practices often highlight gender, assign different roles, and are associated with different attitudes (Alamri et al., 2014; Al-Harbi, 2014) and very different treatment, which may help us to identify some of these effects. We also explore how the effect of perceptions of external factors on subjective readiness to adopt e-learning in Saudi Arabia may illuminate the relationships between readiness, gender, and culture more widely.

This paper is structured as follows: the next section continues with a literature review on e-learning readiness, followed by the research method exploratory and confirmatory stages of the study design and data collection ~~the research model and hypotheses~~, then data analysis. Finally, we present a discussion and our conclusions.

## **Literature review**

A number of studies have explored the dimensions of readiness for e-learning. For example, Warner et al. (1998) undertook one of the earliest studies to assess and explore students' readiness toward e-learning. They proposed that the three dimensions determining e-learning readiness are students' preferences (i.e., attitudes) for online learning over traditional teaching and learning, student confidence in using electronic communication for learning most especially (i.e., communication self-efficacy), and the ability to engage in independent learning. Independent (self-managed or self-directed) learning is the ability of learners to control or manage the learning process regarding content and pace, rather than the teacher prescribing progression. The study established a trend, followed in much later literature, of taking e-learning to be essentially a form of independent, self-directed learning, so that self-efficacy in learning management is a central element in subjective readiness for e-learning. In general, e-learning systems can be of many different kinds, including highly regimented drill-and-practice systems, and they can be used in many different ways in relation to classroom teaching, but self-management is taken to be canonical.

A study designed by McVay (2000), which also aimed to concretize the concept of e-learning readiness, surveyed 13 items, rated by respondents on a 4-point Likert scale, and identified two fundamental dimensions—self-managed learning and comfort with e-learning. It has become a widespread assumption that comfort with e-learning implies that learners feel contented learning using the Internet (Smith, 2005). McVay's

study offers promise since it has shown some validity in his own research as well as other similar research. For example, Smith et al. (2003) carried out an investigative study to test and verify the possible worth of McVay's study. Overall, 107 undergraduate university students in Australia and the United States of America from a variety of educational contexts completed a survey, which was then scrutinized under a reliability and factor analysis. The study also generated two dimensions: comfort with e-learning and self-managed learning as suggested by McVay. Similarly, Smith (2005), who studied 314 Australian undergraduate university students, exploring the validity of McVay's study, identified the same two factors. These same two dimensions (comfort with e-learning and self-managed learning) were again included in comparable findings from the study conducted by Blankenship and Atkinson (2010). However, Watkins et al. (2008) added access to technology (i.e., computer and the Internet) to the two dimensions proposed by McVay's study.

Hung et al. (2010) have built on McVay's (2000) study and relevant literature (e.g., Garrison, 1997; Ryan & Deci, 2000) to develop the Online Learning Readiness Scale (hereafter, OLRs) to measure the readiness of students at the university level to use e-learning. The OLRs is composed of five dimensions: computer/Internet self-efficacy (i.e., online learners' ability to demonstrate proper computer and Internet skills); learner control (i.e., online learners' control over their learning and efforts to direct their own learning with maximum freedom); motivation for learning (i.e., online learners' learning attitudes); online communication self-efficacy (i.e., learners' adaptability to the online setting through questioning, responding, commenting, and discussing); and self-directed learning self-efficacy (i.e., learners taking responsibility for the learning context to reach their learning objectives). Hung et al. validated the OLRs with a sample of 1051 college students using confirmatory factor analysis. We



emphasize that, in common with most similar work, the OLRS is based on questionnaires and self-reporting and therefore essentially probes the learners' own perceptions of these dimensions, and hence gauges subjective readiness rather than any objective measure. This is explicit where it refers to self-efficacy but is also the case for the other dimensions. With this particular scale, there is also a question as to whether self-directed learning is distinguished from learner control (although the factor analysis is consistent with this, there is a very clear *prima facie* overlap in the survey items that relate to them), but for our purposes this is not a central issue.

Hung (2016) has also argued for a study that explores the e-learning readiness of teachers-as-learners. This later work built on that of McVay (2000) and Hung et al. (2010) and aimed to enhance understanding of the readiness of teachers-as-learners to engage in e-learning. Termed Teacher Readiness for Online Learning Measure, the work assessed elementary and middle school teachers' readiness to use e-learning to learn. The study cited two datasets (128 and 248 teachers) and the results of exploratory and confirmatory factor analysis supported by an 18-items survey. The measure identified communication self-efficacy (i.e., learners' adaptability to the online setting through questioning, responding, commenting, and discussing); learning transfer self-efficacy (i.e., the degree to which individuals effectively apply the skills and knowledge gained from a training program to a job situation); and self-directed learning (i.e., learners' capacity for taking the initiative and responsibility for establishing personal learning goals). Again, we emphasize the way in which this is actually a measure of subjective readiness. Similar considerations apply to the Mobile Learning Readiness scale of Lin et al. (2016), though they noted the potential of deriving population norms to "offer much more strategic thoughts" (p. 278).

Thus far, this section has explored the literature on the e-learning readiness of students. As demonstrated in Table 1, overall 11 dimensions have been identified and discussed: attitudes, motivation, confidence in self-management, computer/Internet self-efficacy, learning control, online communication self-efficacy, learning transfer self-efficacy, comfort with e-learning, as well as access to a computer and the Internet. These dimensions appear to overlap and can be grouped under three broad dimensions: personal drivers (i.e., attitudes, motivation, and comfort with e-learning), self-efficacy (in self-management, computer/Internet use, learning control, online communication, self-directed learning and learning transfer), and personal access to tools (i.e., access to a computer and access to the Internet).

**Table 1.** Dimensions of readiness identified from the literature.

Broad dimensions	Dimensions	Dimensions							
		Warner et al. (1998)	McVay (2000)	Smith et al. (2003)	Smith (2005)	Watkins et al. (2008)	Blankenship & Atkinson (2010)	Hung et al. (2010)	Hung (2016)
Personal drivers	Attitudes	✓							
	Motivation							✓	
Self-efficacy	Comfort with e-learning		✓	✓	✓	✓	✓		
	Confidence self-managed		✓	✓	✓	✓	✓		
	Computer/Internet self-efficacy							✓	
	Learning control self-efficacy	✓						✓	
	Online communication self-efficacy	✓						✓	✓
	Learning transfer self-efficacy								✓
Personal access to tools	Self-directed learning self-efficacy							✓	✓
	Access to computer					✓			
	Access to Internet					✓			

However, the studies explored above have limitations. For instance, they generally failed to take into account the underlying external factors affecting the

dimensions of readiness for e-learning and admitted no place for qualitative attention to the individual students' perspectives on the dimensions of readiness for e-learning and the external factors. The approach taken by previous studies may be an oversimplification and may have limited value from the perspective of students. For instance, by relying on concepts from other literature, such as technology acceptance and dropout risk in online learning, to suggest the dimensions of readiness of students, the methods might be seen as problematic because they tended to treat learners as if they were isolated individuals and failed to respect the environmental and social settings in which they were embedded. For example, a widely discussed approach to acceptance is the technology acceptance model, originally proposed by Davis (1989). The model assumes that behavior in relation to technology is driven by behavioral intentions, and that these are determined mainly by individuals' attitudes and their perceptions of the usefulness of a technology. From our perspective, this neglects a variety of contextual aspects that we identify later in this section.

Furthermore, a qualitative engagement with individual research participants, instead of the use only of questionnaires, would have been more pertinent to students' readiness needs, since that would have offered students the opportunity to identify what they considered to be the dimensions of their readiness, and what they considered as the external factors affecting them. We emphasize that questionnaires and surveys can access only a subjective view, but even this is limited; for example, it takes for granted individuals' interpretation of the survey items.

More than any of the above studies, we point to the importance of a sociocultural dimension to learning, as espoused, for example, by Vygotsky (1978) and Knox (2014). At the centre of this approach is the notion of context. Vygotsky argued that the development of human cognition stems from, and is shaped by, participation in

social activities within situated contexts. This departs from the models of e-learning readiness discussed, where context is not fundamental. Kalaja and Barcelos (2006) have also noted that context is not a static concept, nor a mere recipient for social interaction; it is dynamic and ever changing. In addition, it can be understood as a “socially constituted, interactively sustained time-bound phenomenon [where] each additional move within the interaction changes the current context while creating a new area for new interaction” (Duranti & Goodwin, 1992, p. 341). Vygotsky stressed the significance of an interplay between internal factors (referred to here as personal factors) and external factors, which include the social and cultural context. In the research described here, the identified personal and external factors help to explain the subjective readiness of students to use e-learning within their given context.

### **Research method**

This research used a mixed methods approach, a “class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study” (Johnson & Onwuegbuzie, 2004, p. 17). This approach was used not to substitute for either of the two approaches (quantitative and qualitative) but to produce distinctive findings by drawing from the strengths of both approaches, while reducing their weaknesses. This was done in two stages in order to answer the research questions.

The first stage involved the use of a qualitative method, as an exploratory stage, to explore investigate the dimensions of readiness for e-learning, and the external factors affecting them, as well as establishing the study’s research model and hypotheses. These factors were unknown at the start of the research from the student perspective (this stage is detailed in the Exploratory stage section).

The second stage, developing a confirmatory factor analysis, involved the use of a quantitative method based on the outcome of the first stage. This included developing a questionnaire to empirically test the research model and any gender differences in the effects of the external factors on the dimensions of readiness for e-learning (this is detailed in the Confirmatory stage section).

## **Exploratory stage**

### ***Sample and data collection procedure***

In order to have a deeper exploration of the dimensions of readiness for e-learning, and the external factors affecting them, we carried out face-to-face in-depth interviews, involving a sample of 16 students (8 males and 8 females). The sample was drawn from students of the preparatory year group at Jazan University; having recently left high school, they were able to look back and provide articulate opinion about their past experiences, and able, from a position of just starting university, to see the importance of e-learning in their studies. The selection of different genders was a primary criterion in order to ensure gender balance, and because the underlying factors of readiness of each gender to use e-learning may be different. The student sample were also diverse in their e-learning experience and discipline, to include wider views about the research issue.

Following the data saturation method as noted by Gorard (2001), the number of interviewees was deemed to be sufficient because the interview of the last student did not reveal any substantially new understandings in the respondents' views of the underlying factors of readiness, suggesting that all their principal views had been uncovered. All interviews followed the same approach, lasted about an hour, were audio recorded, and later transcribed for analysis. They were carried out face-to-face in 2016.

Participants were reminded of their right to refuse to answer any question(s) that they did not feel comfortable discussing or to stop participating at any time. ~~The interviewer~~ It was stressed that there were no right or wrong answers and that everyone's perspectives were valued since the research aimed at hearing as many different thoughts and voices as possible on the subject matter. Participants observed to be inactive were also encouraged to contribute to the discussion. Between some more general opening and closing questions concerning personal and academic history, and experiences in e-learning (for a complete list, see Mutambik, 2018, Appendix A, p. 274), the main questions addressed were:

- Once we have gotten the idea of e-learning, personally, what factors would indicate your readiness to use it?
  - Follow-up question: Which of these factors is the most important?
- Personally, what factors would influence your readiness to use it?
  - Follow-up question: Which of these factors is the most important?
- Generally, in the future, what do you think will help in the integration of e-learning into the teaching and learning?
  - Follow-up question: What should be done about it?

Let's talk about the needs of students to develop their learning and the possibility of using e-learning to help improve and to meet those needs. What needs to be addressed in order to make the use of e-learning possible? The following section presents the main findings from the exploratory stage, which laid the foundation for the establishment of the research model and hypotheses.

### ***Results of the exploratory study***

The findings of this stage were reached using a thematic analysis approach, which is “a method for identifying, analysing and reporting patterns (themes) within data” (Braun & Clarke, 2006, p. 97). This involves the identification, examination, and interpretation of themes in textual data as well as asking how the findings helped answer the research questions. To ensure that the process to reach the findings was also rigorous, data were triangulated, involving a thorough comparison of the views of different responses—that is, males versus females—in order to establish areas of convergence, divergence, and/or complementarity. Convergence of views indicated a common understanding both within and between groups of participants; divergence showcased differences in understanding; and complementarity data helped in giving a fuller understanding of the research.

Similar to previous studies (e.g., Hung, 2016; Hung et al., 2010; McVay, 2000; Smith et al., 2003), findings showed three dimensions of readiness for e-learning, namely e-learning self-efficacy, personal access to tools, and personal drivers. However, the findings also showed three external factors that might have an impact on the dimensions of readiness for e-learning, which have been overlooked by earlier research on e-learning readiness. We define these external factors as follows:

- social support: the extent to which participants perceive the combined effect of family support and peer support as being available or not for their use of e-learning;
- the characteristics of e-learning: the extent to which participants perceive the ease of use and usefulness of e-learning for their learning;
- in-school support: the extent to which participants perceive the combined effect of the technology required, management support, and technical support as being available or not for their use of e-learning.

Table 2 shows examples of respondent statements illustrating the findings from the exploratory study, which are discussed in the rest of this section.

**Table 1.** Interviews’ main findings with respondent statements as examples.

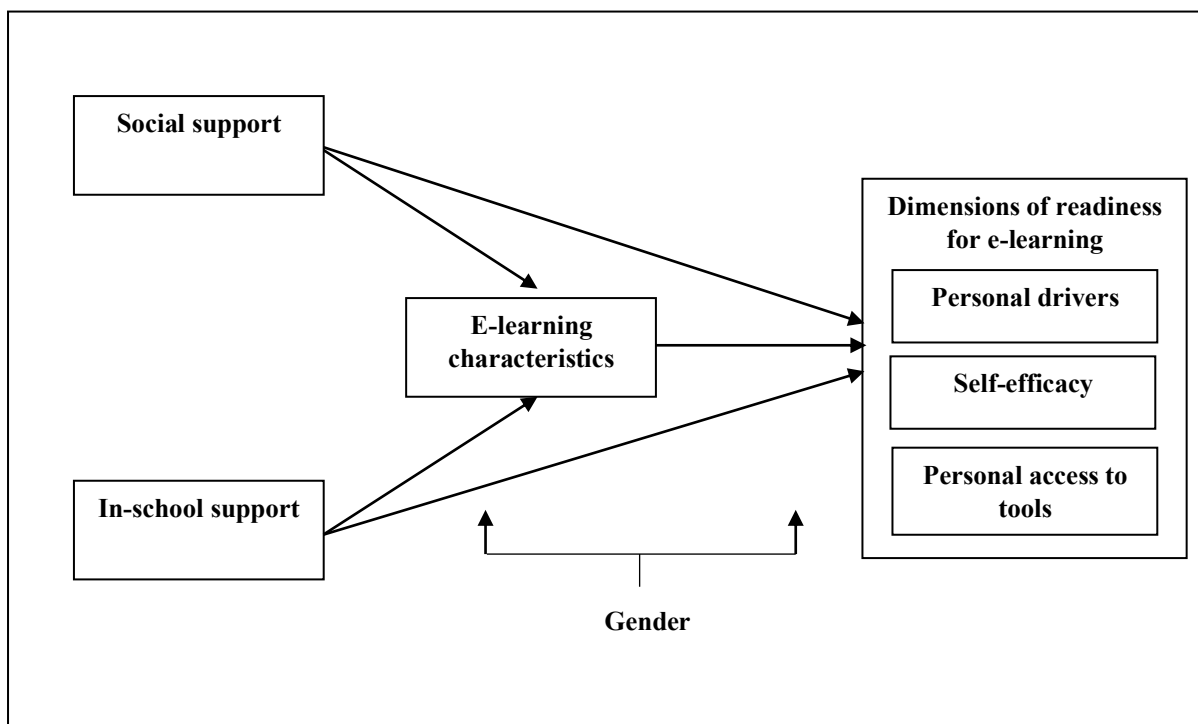
<b>Factors</b>	<b>Respondent statements</b>
Self-efficacy	We don’t have any skill with this technology well we will have anxiety about e-learning, so, we think this kind of lack of skill will stop us to be ready using e-learning. (Male student) Sometimes e-learning requires high skills in computer and use of the Internet... Skill is very important for me to be ready. (Female student)
Personal access to tools	For me to be ready to use e-learning ... I need access computer and Internet at home. Sometimes they not available ... I hope my school help for that. (Male student) Because of the cost of computers and the Internet ... me and other students need personal access. (Female student)
Personal drivers	Students are growing up with using computer and Internet ... I think my attitudes is positive. I can see it from this view I’m ready. ..., I count attitudes as one factor shape readiness for e-learning. (Male student) Attitude very important factor here ... take it into consideration. (Female student)
E-learning characteristics	The one thing that stimulates me to use e-learning is the huge amount of information that is easily accessible on it. ... This help me to work hard to build their skills as well. (Female Student) E-learning is a new into Saudi schools ... it usefulness is not known ... this might affect attitudes to use it ... even for family to buy computer and provide Internet. (Male student)
Social support	E-learning will not be consistent with my parents’ worldview .... They don’t understand the advantages of using e-learning. ... this will affect on my readiness. (Female student) Family and friend support can build up skills and attitudes toward e-learning. (Male student)
In-school support	Based on weakness in teaching computer subject in the school from the early stages, this is why some students if not the majority have low level of knowledge and skill using computer and Internet needed to use e-learning successfully. ... we need support from our schools. (Female student) With the support of school administration and the availability of devices for the use of e-learning ... I will be excited to use e-learning and I have sufficient skill. (Male student)

### ***Development of the research model and hypotheses***

We developed the research model through an informal discussion of our first stage findings, then through comparison with relevant literature. Compared with the majority of the reviewed literature on readiness, the findings from our exploratory stage suggested that several factors needed to be taken into account beyond the widely recognized dimensions of readiness (personal drivers, self-efficacy, and personal access to tools). We noted that students highlighted the importance of social support for their e-learning, especially from family and friends—without this, they struggle to achieve



success using tools and practices that may be seen as alien or possibly even dangerous. They also needed the support of their school, since this is where their new skills will be acquired and integrated with their other learning. Additionally, we found that recognition of the ease of use and usefulness of e-learning technology (which we term *e-learning characteristics*) is key to developing the necessary motivation and skills (see Figure 1). We proposed that support factors, social or in-school, contribute on the one hand to the recognition of e-learning as useful and easy to use, and on the other hand directly to the fundamental dimensions of readiness collectively. The various influences may be complex and subtle: the recognition of e-learning characteristics will also contribute to the dimensions of readiness, specifically personal drivers and self-efficacy.



**Figure 1.** Research model.

In the following subsections, we will discuss further the basis for proposing these links and show how we derived the hypotheses, which we then used to try to bring evidence to bear on the nature and relative strength of the connections.

In itself, this model is agnostic as to gender, but our proposition was that differential effects might emerge as we looked at how the factors combine, when seen through the lens of gender as a moderating variable operating across the links.

### *The influence of in-school support*

By identifying and including in-school support in this research, we attempted to estimate the readiness of students within the school context and how that influences individual readiness for e-learning. The interview respondents highlighted, for example, the need for administration and technical support as well as the availability of needed devices in the school to enhance their readiness. In similar studies, Ngai et al. (2007) and Selim (2007) highlighted the importance of institutional support to adopt technology. Passmore (2000) also indicated that, to make progress in technology adoption, it is necessary to satisfy the technological requirements of institutions in order to meet the students' expectations. On the other hand, lack of support would have a negative effect on technology adoption and possibly lead to a rejection of such technology altogether (Cheung & Huang, 2005; Lim & Khine, 2006; Selim, 2007). In this study, the significance of in-school support manifested through the interview findings. To explore the influence of in-school support in the context of e-learning readiness, we advanced the following hypothesis:

- H1: Students' anticipation of in-school support for e-learning is positively associated with their level of readiness for e-learning.

Mahmood et al. (2001) carried out a meta-analysis of 57 studies that explored the factors that affect information technology usage and found school support to be among the factors with the highest effect on students' perception of e-learning characteristics (ease of use and usefulness). H. Al-Harbi (2014), N. O. Ndubisi (2004), and Passmore (2000) showed that students who perceived e-learning as an easy-to-use

and useful tool for their study were associated with schools that provided them adequate facilities and technology infrastructure and support. To understand this in the area of e-learning readiness, we proposed the following hypothesis:

- H2: Availability of in-school support is positively associated with the students' perception of e-learning as useful and easy to learn.

#### *The influence of social support on student readiness*

Unlike much previous research on e-learning readiness, interview respondent statements showed the importance of experiencing social support (manifested in family and peer support) for students' subjective readiness for e-learning (see Table 2). Following Vygotsky's (1978) approach to individual learning in a social setting, as mentioned earlier, it can be argued that the students' readiness for e-learning and social support are inseparable and interdetermining. N. Ndubisi (2006) and Zolait et al. (2009), for example, noted the critical importance of the home in e-learning, since unlike classroom-based education, e-learning activities often occur in the home and with peers, drawing the attention of parents and peers to students' activities. Moreover, H. Al-Harbi (2014) argued that social support affects how students perceive e-learning as useful and how easy it is for their study. Based on the interviews, similar literature to e-learning readiness, and the conceptualization process, we formulated the following hypotheses:

- H3: Recognition of social support is positively associated with the dimensions of readiness for e-learning.
- H4: Recognition of social support is positively associated with the students' recognition of e-learning characteristics.

#### *The influence of e-learning characteristics on student readiness*

As seen in Table 2, the exploratory findings suggested that, for instance, when students

perceive that e-learning is easy to use and useful for their study (referring to e-learning characteristics), it will enhance their readiness for e-learning. Many authors considered that e-learning characteristics might have a greater effect in creating a positive attitude toward and enhancing self-efficacy to use it. For example, Huang et al.'s (2006) survey of take-up by the unemployed, Ngai et al.'s (2007) research with 836 Hong Kong students using WebCT, and Park and Choi's (2009) work in South Korea supported perceived usefulness and ease of use as a motivator of technology adoption. In line with the findings from the exploratory study and literature review in educational technology, we formulated the following hypothesis:

H5: Students' perception of e-learning characteristics is positively associated with the dimensions of readiness for e-learning.

#### *The role of gender as a moderating variable*

Although there is a lack of research in relation to e-learning readiness and gender, broadly, the significance of gender in technology adoption over the years has appeared as substantial, yet controversial. For example, disregarding context, some research has shown that the males are more accepting of technology (e.g., H. Al-Harbi, 2014; K. Al-Harbi, 2010); other research has suggested the contrary view (e.g., Keller et al., 2007) or no gender differences (e.g., Yukselturk & Bulut, 2009). Acceptance is surely related to readiness; it is not clear how, but we envisage that it has to do with context. Suppose, for example, that readiness is some function of acceptance and opportunity: both of these would be subject to the effects of context, and very probably in gender-specific ways.

To try to relate this issue specifically to students' readiness for e-learning, we developed the following five hypotheses, investigating our proposition that gender

differences would show up in essentially all the aspects of our model, and hence all the links in Figure 1:

- H6: The effects of social support on the dimensions of readiness for e-learning differ between male and female students.
- H7: The effects of social support on students' perception of e-learning characteristics differ between male and female students.
- H8: The effects of in-school support on the dimensions of readiness for e-learning differ between male and female students.
- H9: The effects of in-school support on students' perception of e-learning characteristics differ between male and female students.
- H10: The effect of students' perception of e-learning characteristics on the dimensions of readiness for e-learning differ between male and female students.

We note that there are many subtleties here that these hypotheses cannot capture; for instance, the distinction between having different social support and reacting to similar support differently. This can be only an initial attempt to see where, and to roughly what extent, differences may exist.

### **Confirmatory stage**

#### ***Development of the research questionnaire***

Although there are different ways to generate questionnaire items (see Greene, 2007; Straub & Gefen, 2004), in the present study, we used a review of the literature and the results of interviews to develop the questionnaire items that represent each identified factor. Overall, we generated 28 items. When possible, we adapted the items based on existing scales in the domain that have been proven reliable. For example, we adapted

items representing in-school support from previous work by Ngai et al. (2007).

However, we developed a major proportion of the items specifically from scratch, in order to meet the needs of the current study. Questions concerning dimensions of readiness for e-learning (personal drivers, self-efficacy, personal access to tools), for instance, were:

- I am skilled enough to use e-learning in my learning without help.
- I am skilled enough to use e-learning in my learning even if I have not used such a system before.
- In my home I have a computer to use for e-learning whenever I need.
- In my home I have Internet connection to use for e-learning whenever I need it.
- Using e-learning in learning is a good idea.

The responses to the questionnaire were registered on a 5-point Likert scale. The validity of the personal drivers construct was confirmed through analysis as described below.

The questionnaire was piloted with 16 randomly selected high school students (8 males, 8 females) to ensure the clear understanding of the questionnaire by the target participants (Bell, 2005; Van Teijlingen et al., 2001). The students contributed valuable feedback (i.e., clarifying and ordering of questions), which was a worthwhile exercise that improved the final version of the questionnaire.

### ***Content validity assessment***

As noted previously, in order to meet the needs of the current study, we adapted some items from a previously validated questionnaire (created by Ngai et al., 2007) and developed other items from scratch. Therefore, there was a need to revalidate the items

before collecting primary data using content validity (Straub & Gefen, 2004). Content validity is “the degree to which individual items represent the construct being measured, and cover the full range of the construct” (Field, 2013, p. 13). In order to assess the content validity, the current research relied on the expert judgment method. This meant that we sought expertise based on their experience, standing in the field, and qualifications as well as research output (Lynn, 1986). Regarding the ideal number of experts’ reviews, no firm consensus exists in the field, although a minimum of three appears to be the norm (see Lynn, 1986). In this study, we used six expert reports to assess the content validity of the research questionnaire: four doctoral candidates in the field from Manchester Metropolitan University, a professor of educational technology at Jazan University, and a professor of educational technology at King Saud University in Saudi Arabia.

We contacted the selected experts by email and asked them to participate. To those who agreed, we forwarded a package of documents, that is, an introductory letter introducing the research and the questionnaire. We invited the experts to identify and include in their reviews any errors, repetition, ambiguities, or possible points of misunderstanding of the questionnaire. We also invited the reviewers to recommend any changes, such as questions to be removed, amended, and/or clarified. We sent three reminder emails to ensure the experts returned completed response forms within 3 weeks of dispatch; all six did so.

Based on the experts’ judgment, the initial item pool of 28 items was reduced to 21 items with an acceptable degree of content validity. We then sought a second review of the 21 items before collecting the primary data. No other concerns were raised, indicating that, overall, the content validity of the questionnaire was supported.

### **Primary Questionnaire data collection**

We ultimately adopted a cluster sampling technique for this study, although a range of different types of sampling technique and strategy were considered. We invited, in total, 106 high schools in Jazan Province in Saudi Arabia to participate in this research study in 2017, randomly selected using an online random number generator. Our intention was to administer the questionnaire online. Of the 106 schools (62 male and 44 female) contacted online, there were responses from only 19 and 7 of these schools respectively. This meant that 43 male and 37 female schools did not respond to the online invitation. The gender distribution of those who participated in the online questionnaire was 54 male students (from 19 schools) and 53 female students (from 7 schools).

We decided to distribute the same questionnaire using hardcopy in order to improve the response rate. We distributed the questionnaire to the remaining 80 schools (43 male and 37 female), giving each school 10 copies. Out of the 80 schools, 47 responded (28 male and 19 female). The gender distribution of the returned hardcopy questionnaire was 126 male students from 28 schools and 144 female students from 19 schools. Table 3 below provides the overall distribution of the administered questionnaire. In the analysis, we aggregated the data from the questionnaire responses obtained via the two methods, since there is no reason to expect that the collection method would affect the responses in any relevant way.

**Table 2.** Questionnaire sample distribution.

<b>Distribution method</b>	<b>Male</b>	<b>Female</b>	<b>Total per method</b>
Online	54	53	107
Hardcopy	126	144	270
<b>Total participants</b>	<b>180</b>	<b>197</b>	
<b>Overall total</b>			<b>377</b>

### **Data analysis**

The data analysis for the confirmatory study stage started with data coding and cleaning



the raw data using a statistical package (SPSS version 21). For example, to ensure the accuracy of entering data scores of each question, the minimum, maximum, and frequency scores were checked. Finally, an assessment of the data was conducted to find out possible missing data, as recommended by Hair et al. (2011).

The main analysis involved using structural equation modeling to examine the measurement model's psychometric properties and test the hypotheses. The software package Amos (version 26) was used for the estimations.

### *Testing measurement model*

We tested the strength of the measurement model in this study firstly by construct validity, which is “the extent to which a measured variable actually measures the conceptual variable (the construct) that it is designed to assess” (Stangor, 2007, p. 92) and secondly by internal consistency reliability, which is “is whether an instrument actually measures what it sets out to measure” (Field, 2013, p. 11). To measure model quality, we used factor loading  $> 0.6$ , Cronbach's alpha (CA), and composite reliability (CR)  $> 0.7$  as well as average variance extracted (AVE)  $> 0.5$ , as recommended by Hair et al. (2011) and Fornell and Larcker (1981).

The results of the analysis, as shown in Table 4, demonstrate that all the factor loadings are greater than the threshold criterion of 0.6. Moreover, Table 5 shows that all values of CA and CR are above the threshold criterion of 0.7, while AVE for each construct is higher than 0.5 (Fornell & Larcker, 1981) and square root value of each constructs' AVE (diagonal values in bold) are greater than all values on the rows below. We can therefore conclude that internal consistency reliability and evidence of construct validity (both convergent validity and discriminant validity) of measurement model was ensured.

Table 4. Constructs, items with factor loadings, and sources.

Constructs	Items	Loading	Source
<b>DREL</b>	DREL1: I am skilled enough to use e-learning in my learning without help.	0.74	Self-developed based on the qualitative data
	DREL2: I am skilled enough to use e-learning in my learning even if I have not used such a system before.	0.69	
	DREL3: In my home I have a computer to use for e-learning whenever I need.	0.82	
	DREL4: In my home I have Internet connection to use for e-learning whenever I need it.	0.83	
	DREL5: Using e-learning in learning is a good idea.	0.72	
<b>ELC</b>	ELC1: Interacting with e-learning systems is (or would be) clear and understandable.	0.66	(Davis, 1989; Ngai et al., 2007).
	ELC2: Using e-learning in my learning is (or would be) easy for me.	0.62	
	ELC3: Using an e-learning system improves (or would improve) my learning performance.	0.70	
	ELC4: E-learning offers (or would offer) me flexibility in learning with respect to time and place.	0.79	
	ELC5: In general, I think an e-learning system is (or would be) useful in my learning.	0.71	
<b>SS</b>	SS1: My family believes that using e-learning for learning is a good idea.	0.64	Self-developed based on the qualitative data
	SS2: My family encourages (or would encourage) me to use e-learning for learning.	0.65	
	SS3: My family sees e-learning as something that improves (or could improve) my performance in learning.	0.84	
	SS4: My friends/colleagues encourage (or would encourage) me to use e-learning in my learning.	0.92	
	SS5: My friends/colleagues help (or would help) me with e-learning when I need it.	0.76	
<b>ISS</b>	ISS1: The school where I'm studying provides the necessary computer equipment for e-learning.	0.68	(Davis, 1989; Ngai et al., 2007)
	ISS2: The school where I'm studying provides the necessary Internet connectivity for e-learning.	0.68	
	ISS3: In the school where I'm studying, the school management would allow me to use the school's facilities for e-learning.	0.86	
	ISS4: In the school where I'm studying, the school management would support my use of e-learning.	0.74	
	ISS5: In the school where I'm studying, an IT technician is available to provide assistance when I need help.	0.71	
	ISS5: I think that the technical support in the school where I'm studying is good.	0.75	

Note. DREL: dimensions of readiness for e-learning; ELC: e-learning characteristics; SS: social support; ISS: in-school support.

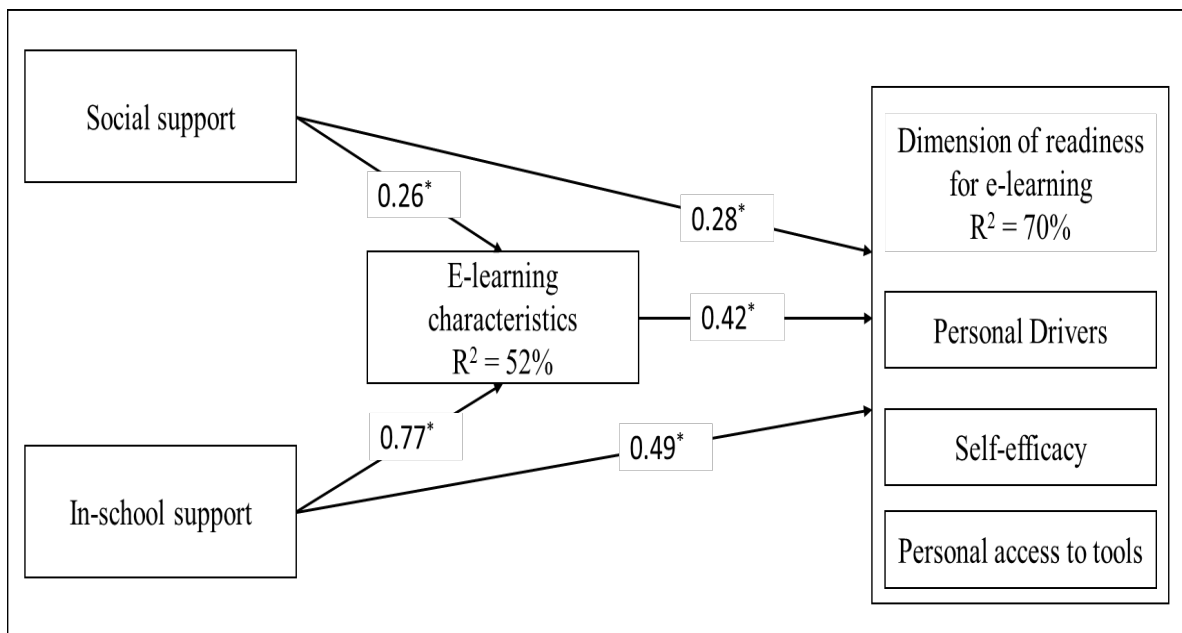
**Table 3.** Correlations, CA, CR, and AVE.

Constructs	CA	CR	AVE	Correlations			
				DREL	ELC	SS	ISS
<b>DREL</b>	0.84	0.87	0.73	<b>0.53</b>			
<b>ELC</b>	0.83	0.83	0.61	0.42	<b>0.37</b>		
<b>SS</b>	0.85	0.88	0.74	0.29	0.26	<b>0.55</b>	
<b>ISS</b>	0.86	0.86	0.70	0.49	0.35	0.46	<b>0.50</b>

Note. Square root of AVE shown in bold as the diagonal.

**Results of structural model evaluation analysis of model's path based on gender**

Figure. 2 demonstrates the analysis results of the structural model test indicating that e-learning characteristics, social support, and in-school support explain 70% of the variance in the dimensions of readiness for e-learning (Chin, 1998). In-school support had the strongest direct effect on the dimensions of readiness for e-learning with a regression coefficient of  $\beta = 0.49$ , followed by the impact of e-learning characteristics and social support (with  $\beta = 0.42$  and  $\beta = 0.28$ , respectively).



**Figure 2.** Results of structural model evaluation using the whole sample. *Note.* \* $p < 0.01$ .

Moreover, social support together with in-school support explain 52% of variance in e-learning characteristics—showing that only a moderate amount of variance is explained (Chin, 1998). In-school support has the strongest direct effect on e-learning characteristics with a regression coefficient of  $\beta = 0.77$ , followed by the impact of social support with a regression coefficient of  $\beta = 0.26$ . Table 6 shows detailed information on the standardized path coefficients and  $t$  values for hypotheses H1–H5, which were all supported.

**Table 4.** Path coefficients and  $t$  values for the whole sample.

Hypothesis	Standardized path coefficient	$t$ value	Support?
H1: In-school support → Dimensions of readiness for e-learning	0.49	6.97*	yes
H2: In-school support → E-learning characteristics	0.77	7.93*	yes
H3: Social support → Dimensions of readiness for e-learning	0.28	4.78*	yes
H4: Social support → E-learning characteristics	0.26	5.10*	yes
H5: E-learning characteristics → Dimensions of readiness for e-learning	0.42	5.88*	yes

*Note.* \*: 0.001 significance

### *Analysis of model's path based on gender*

As can be seen in Table 7, the standardized path coefficients for the male students in regard to the relationship between social support and dimensions of readiness for e-learning as well as e-learning characteristics and dimensions of readiness for e-learning were mostly higher compared to female students. These results supported H6, H8, and

H10.

Moreover, no significant differences between male and female students were found in regard to associations between social support and e-learning characteristics as well as in-school support and e-learning characteristics. Thus, H7 and H9 were not supported.

**Table 5.** Standardized comparisons of paths between female and male students.

Hypothesis	Male ( <i>n</i> = 180)		Female ( <i>n</i> = 197)		Standardized comparisons of paths	Support?
	Standardized path coefficient	<i>t</i> value	Standardized path coefficient	<i>t</i> value	Δ path (Male - Female)	
H6: Social support → Dimensions of readiness for e- learning	0.43***	4.89	0.05	0.89	0.38	yes
H7: Social support → E-learning characteristics	0.36***	3.79	0.22**	2.84	0.14	no
H8: In-school support → Dimensions of readiness for e- learning	0.84***	5.53	0.59***	4.89	0.25	yes
H9: In-school support → E- learning characteristics	0.47***	7.75	0.45***	4.59	0.02	no
H10: E-learning characteristics → Dimensions of readiness for e- learning	0.54***	4.9	0.24**	2.62	0.3	yes

Note. \*\*\*: 0.001 significance; \*\*: 0.01 significance

## Discussion and conclusions

### *Readiness*

The purpose of this study was to provide a detailed examination of the following questions:

Q1. What are the factors that influence subjective readiness for e-learning?

Q2. What are the external factors affecting subjective readiness for e-learning?

Q3. Will the effect of the external factors on subjective readiness for e-learning differ between male and female students?

To answer these questions, we adopted two stages as a mixed methods approach. Based on the findings of the two stages, it can be argued that readiness for e-learning cannot be seen simply as based on self-efficacy, personal access to tools, and personal drivers as suggested by the literature (Blankenship & Atkinson, 2010; Hung, 2016; Hung et al., 2010; Watkins et al., 2008). As demonstrated in our research, readiness for e-learning is a combination of factors that indicate the readiness (i.e., dimensions of readiness) and external factors (i.e., social support, e-learning characteristics, and in-school support) that have an impact on those dimensions of readiness. These findings have presented a more complex and nuanced model and highlighted the possible interplay between the dimensions of readiness and the external factors. Discussions in the literature are often ambiguous about the subjective nature of the readiness that they seek to characterize, but this is actually a key element of the concept. One implication of the findings reported here is that the readiness of students to use e-learning revolves within their understanding and experience of the readiness of a bigger context, including society and school. This means that readiness cannot simply be addressed as an attribute of students but requires to be related to this context and the various aspects of how it impacts on the students. It is important to interpret our research questions and hypotheses in this light: they are all to be seen as relative to the context and to an encounter with the students' subjective responses to that context.

In reference to the research hypotheses, the empirical tests of the model emphasized and revealed that students' perceptions of social support, e-learning characteristics, and in-school support had a significant direct effect on their responses on the dimensions of readiness for e-learning. Thus, hypotheses H1, H3, and H5 were fully supported. Consistent with the proposed research model, we also found that social support together with in-school support had significant direct effects on the perception of e-learning characteristics. Hence, hypotheses H2 and H4 were fully supported. Of the supported hypotheses, in-school support had the strongest significant direct effect on both dimensions of readiness and e-learning characteristics. This means that providing an in-school support strategy and making sure it is clearly understood by students would facilitate and increase the subjective readiness of students to use e-learning. In similar studies, Ngai et al. (2007) have also argued that the provision of effective user support and encouragement to use e-learning systems is a significant predictor of the adoption of technology at all levels in education. But we note here that there is a complex relationship between readiness, adoption, and success. A perception that everything is in place (high subjective readiness) may lead to adoption, but not necessarily success if, in fact, the objective readiness of users and the support available is lower than had been recognized; while, in another situation, users may fail to adopt because of feeling that they are less ready than they actually are. Subjective readiness, as a perception of objective readiness, may be subject to many influences, which could also be different in important ways between different social groups, including males and females—Wang et al. (2009), investigating use intention for mobile learning, observed that “the effect of social influence on behavioral intention was significant for men, but insignificant for women” (p. 112), though again this might be context-dependent, and indeed Wang et al. noted that it is contrary to prior research.

School support is also linked to user satisfaction in other research outcomes (e.g., Miller et al., 2006; Mirani & King, 1994). An implication of this, as previous research findings have highlighted, is that e-learning programs are at risk of failing because of the lack of in-school or institutional support (H. Al-Harbi, 2014; Selim, 2007). Thus, adequate in-school support in the form of the provision of access to computers and the Internet (Xanthidis et al., 2016) and technical support to use e-learning as well as school management support are critical to students' readiness and ultimately the successful e-learning implementation. Therefore, our overall research outcome significantly contributes to theory by providing an alternative perspective on understanding the readiness of students to use e-learning.

It can be argued that external factors are particularly important within contexts that are considered relatively highly "collectivist", as the culture of Saudi Arabia has been argued to be (Alamri et al., 2014; Cassell & Blake, 2012). We conjecture that in these contexts the individual student is more sensitive to support, or the lack of it, from social elements such as their family, peer group, and even broader social attitudes. There is a tendency for the individual to accept and conform with the expectations of others, and perhaps less likelihood that they will persist and succeed in something that is relatively unrecognized or not valued by the wider group. The implication of this is that to a greater extent than in contexts that are more individualistic, the readiness of students in collectivist contexts is likely to be influenced by other external factors, as identified in our research. There is not necessarily a tension or incompatibility between collectivist culture in itself and students having a facility with independent learning, but Chanchary and Islam (2011) found that students in Saudi Arabia do not score highly on the latter. In any case, it is clear that cultural factors have a bearing on the availability or acceptable uses of technology; as, for example, Payvar (2018, p. 357) noted, "use of



ICT for the purpose of education can be challenging in the Muslim context due to Internet content”.

### ***Gender***

In reference to the gender differences, our study revealed significant gender differences in the relationship between the various external factors and e-learning readiness dimensions. For example, the empirical findings showed that, although perceptions of in-school support and social support have significant effects on students' readiness dimensions for e-learning in general, male students perceived more support compared to female students. We also found that in-school support and social support have a greater positive influence on male students' perception of e-learning characteristics than female students', which ultimately affects the e-learning readiness dimensions. Since, in Saudi Arabia, males and females are educated separately, in separate schools, and with teachers of the same gender, there may well be real differences in school support as well as social support and teaching practices generally.

Although there is a scarcity of studies that have taken gender differences into account when exploring students' readiness (Hung et al., 2010; Pillay et al., 2007; but see also Bana et al., 2015 ; Naresh et al., 2016; Ramírez-Correa et al., 2015), the findings of the present study emphasize the importance of considering gender when exploring students' readiness for e-learning and the importance of the role that can be played by social and school supports in the readiness of students for e-learning, especially female students. We propose that the prominence of social influences on readiness in Saudi Arabia exposes an effect which may be smaller, but still may be important, in other contexts. Further research is needed into the details. In a broader sense, the perception that female students have less social and school support brings to the fore issues of gender discrimination and the limiting of opportunities for female

students (Al-Alhareth, 2014; Cooper & Weaver, 2003). These issues within Saudi Arabia and many other similar contexts are relatively systematic, but it is also significant to acknowledge that there seem to be modest changes structurally and at the individual family level that challenge gender discrimination and limiting of opportunities for female students. For example, an investigation by Wiseman et al. (2018, p. 240) found that “[f]emale teachers’ use of technology in the classroom is more frequent and of different types than that of males” and concluded that:

In a system that some might see as only a disadvantage for girls and women, information and communication technology use is actually creating opportunities for females that lead more directly to Saudi Arabia’s knowledge economy development and participation than other uses of technology in schools have done so far.

The picture is not simple, overall, but this further supports our contention that readiness cannot be addressed without regard to the complexity of how support is manifested. The implication is that social and school support stand as major factors in the readiness of students to use e-learning, especially for females, which need to be taken into consideration when planning to adopt e-learning programs, in order to enhance its successful implementation. This means that any plan to implement e-learning in schools should consider the role of society and schools, and how to navigate around possible issues of concern. Therefore, knowledge of such differences has a particular significance for any education system looking to adopt e-learning to enhance students’ learning. It is also important to point out that excluding gender differences from the analysis, as many researchers do in the e-learning readiness literature, may miss nuances which can ultimately affect students’ readiness to adopt and use e-learning. The

current study emphasizes the value of devoting specific research attention to the needs of gender in the e-learning readiness area.

In conclusion, when exploring student readiness for e-learning, researchers should not treat students as if they are individuals isolated from the environmental and social settings in which they are embedded. This environment brings to bear external factors on the students' thinking and acting, which inevitably condition complex cognitive constructs such as their readiness for e-learning. Our model, depicted in Figure 1, shows perhaps only a crude analysis of the factors and the relationships, but even this recognizes subtleties that are commonly neglected. This model indicates that gender, as a pervasive influence on the links in the model, also should not be overlooked. In different times and places—in different cultural contexts—the weights on the linkages, as in Figure. 2, and the effects of gender, will be different. In Saudi Arabia, perhaps, gender differences are stark, but then again perhaps narrowing (Al-Alhareth, 2014; H. Al-Harbi, 2014; Doğan, 2016; Gamdi & Samarji, 2016; Thomas, 2016; Wiseman et al., 2018). Such changes are perhaps essential before we will see substantial change to readiness for e-learning and the success of its deployment. However, it is also possible that, for example, the sudden and unexpected increase in the adoption of e-learning and distance learning in the first half of 2020 will accelerate these changes. This may present a valuable opportunity for further research into the interconnections between learning practices and the social context within which they occur.

Although anything specific in our observations can, of course, be interpreted only with considerable caution in relation to other cultural contexts, we suggest that the model itself overall provides a useful way of thinking about the key issues that need to

be considered in trying to characterize students' readiness (subjective or objective) for e-learning.

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### **Disclosure statement**

No potential conflict of interest was declared by the authors.

### **Notes on contributors**

Ibrahim Mutambik is assistant professor at the Department of Information Science - College of Arts - at King Saud University, Saudi Arabia. He gained his PhD in the School of Informatics, University of Edinburgh, UK. His research interests focus on learning analytics, online learning, knowledge management, and knowledge sharing.

John Lee is professor of digital media in Edinburgh College of Art and School of Informatics, University of Edinburgh, UK. He holds a PhD in cognitive science from Edinburgh. Having worked in computer-aided design, artificial intelligence, representation, reasoning, and learning, his recent research focusses on technology in learning and teaching.

Abdullah Almuqrin is assistant professor in Information Science, King Saud University, Saudi Arabia. A vice dean of the deanship of library affairs, he holds a PhD in technology specialized in information assurance from Eastern Michigan, USA. His current research interests include information systems, security, policy and privacy, and knowledge management.

### **ORCID**

Ibrahim Mutambik <https://orcid.org/0000-0001-6819-5244>

John Lee <https://orcid.org/0000-0002-0914-2975>

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