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When it comes to MOOCs, where you are from makes a difference

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ABSTRACT

Millions of learners have enrolled in MOOCs in the last few years. However, little is known about the essential skills students need to succeed in MOOCs. Even less is known about how country of origin or other aspects such as gender might affect these skills. By integrating the resources and appropriation scholarship with second-level digital divide research, this study considers skills used to engage ICTs with self-efficacy and locus of control among MOOC learners from five regions. Results from surveying 2882 learners who enrolled in five English and Arabic MOOCs reveal significant differences among learners from various regions. Based on the region in which they live, some of the learners have significantly higher skills than learners in other regions. Furthermore, male learners from three of the five regions have higher levels of engagement with ICTs than female learners. These findings inspire important considerations for future educational programs.

1. Introduction

In the last few years, millions of learners around the globe have enrolled in massive open online courses (MOOCs) provided by several platforms (Zhenghao et al., 2015). MOOCs are distance-learning courses that are open to any learner who registers, and a single MOOC might admit thousands of learners (Weingarten, 2016). MOOCs draw on developments in information and communications technologies (ICTs), and online and distance education, but the MOOC market is still in an early stage (Klobas, Mackintosh, & Murphy, 2015), and "a sustainable configuration of individual, institutional, and commercial providers is yet to emerge" (p. 18). Although very large numbers of learners around the globe have enrolled in MOOCs, very little is known about learners' "experience … what they learn, what works, and what does not work" (p. 19).

Furthermore, many scholars have discussed the importance of investigating learner readiness for online learning. Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, and Marczynski (2011) noted that with the continued increase of offered online courses, understanding learner readiness for e-learning is very important. The authors argued that this can be accomplished by understanding learner characteristics and ICTs engagement. Several studies have looked at learner readiness for taking a course online (e.g. Kaur & Zoraini Wati, 2004; Keramati, Afshari-Mofrad, & Kamrani, 2011; Smith, 2005), but they were limited by surveying students from one or just a few colleges or students from one or a few countries. Moreover, learners who participated in these studies are different from most MOOC learners, as the latter have a wider range of differences in terms of age, characteristics, levels of engagement with ICTs, or English fluency.

Guo and Reinecke (2014) noted that the current generation of MOOCs attract learners from different countries; however, very little is known about MOOC learner readiness for online education across countries and varied cultures, as many previous studies

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focused mainly on learners enrolled in regular online courses offered by universities in the same country (e.g. Atkinson & Blankenship, 2009; Aydın & Tasci, 2005) or only in two different countries (e.g. Brahmasrene & Lee, 2012; Smith, Murphy, & Mahoney, 2003). In 2013, one of the main MOOC providers in the U.S. announced a partnership with a foundation in the Arab States region to develop a MOOC platform that offers MOOCs in Arabic (Hazlett, 2013). The plan for the new platform was to offer Arabic translations of some of the courses offered through the U.S. MOOC platform and to develop new courses taught by Arab faculty members and professionals (Hazlett, 2013). This initiative considers English proficiency to be a limitation, as some of the learners in the Arab States might not be confident enough to learn through MOOCs offered in English. However, this initiative did not look at learners' readiness for online learning in regard to their levels of engagement with ICTs, self-efficacy, and locus of control. According to Hannon and D'Netto (2007), learners from different cultures vary in their abilities to utilize online learning technologies. Previous studies (Lim, 2004; Mueller & Thomas, 2000) show that cultural differences can contribute to learners' self-efficacy and locus of control. Therefore, this study seeks to bridge the gap by examining the similarities and differences among MOOC learners from different regions and focusing on learners enrolled in MOOCs offered by providers based in the U.S. and Arab States. It identifies whether MOOC learners' levels of engagement with ICTs, self-efficacy, and locus of control differ from one region to another and examines if gender moderates the relationship between region and MOOC learner ICT engagement.

2. Learner readiness for the MOOC

The rapid and widespread diffusion of ICTs has brought new and varied approaches to education and increased the number of education providers who have global, national, and international influence. A great number of colleges and universities are developing and offering online courses and programs, providing additional educational opportunities (Lee, 2010). Consequently, the number of courses and programs available online has increased significantly. In the U.S., for example, Allen and Seaman (2014) noted that the number of students taking at least one online course has increased from 1.6 million students in fall 2002 to 7.1 million in fall 2012. This increase represents a compound growth rate of 16.1 percent per year; in the same period, the annual growth rate in higher education was only 2.5 percent; the number of students in higher education was 16.1 million in fall 2002 and 21.3 million in fall 2012.

Additionally, the number of offered MOOCs keeps increasing. For instance, in the U.S. only 2.6 percent of institutions offered a MOOC in 2012, but the number had almost doubled in 2013 to 5.0 percent and in 2014 to 8.0 percent (Allen & Seaman, 2013, 2014, 2015). In the Arab region, several governments have also rushed to create online learning projects and programs for different education levels (Mirza & Al-Abdulkareem, 2011). For example, in Saudi Arabia, a fully Arabic MOOC platform was launched in 2013 called Rwaq (Curley, 2013). The author noted that Rwaq is a new educational initiative and offers tuition-free MOOCs that are taught by local professors and is in the process of becoming one of the regional hubs for online learning in the Middle East. An online survey that was conducted in the Arab region showed that respondents viewed using different technologies and online resources in the classroom positively ("Transforming Education in the Arab World," 2013). According to the findings, about 67 percent of the participants said that if online learning resources were made available in their academic institution, they were willing to take advantage of them. With reference to utilizing specific types of technologies in the classroom, the use of collaborative web tools such as Wikis and Google Docs, computers, laptops, and tablets ranked the highest, while the use of social networking sites (SNS) ranked the lowest. Furthermore, the findings showed that students, teachers, and parents had similar responses regarding what students should be allowed to do in the classroom ("Transforming Education in the Arab World," 2013).

Dray, Lowenthal, Miszkiewicz, Ruiz-Primo, and Marczynski (2011) argue that with the continued growth in online learning, understanding learner readiness for online learning is essential. They note that this can be achieved by understanding learner characteristics and ICTs engagement. According to the authors, learner characteristics refer to "individual beliefs in their ability to complete a college degree, beliefs about responsibility in problem solving (academic and technical), self-efficacy in writing and expression, orientation to time and time management, and behavior regulation for goal attainment" (p. 32). Dray et al. (2011) also noted that ICT engagement refers to four main areas: basic technology skills (ability to use certain applications such as email, the Internet, documents, and spreadsheets); access to technology (ownership of technology and access to the Internet); usage of technology (frequency and nature of use); and relationship with ICTs (values, beliefs, and confidence with technology). The ICTs engagement definition was drawn from several researchers' scholarship on the digital divide (e.g. DeTure, 2004; Hsieh, Rai, & Keil, 2008; van Dijk's, 2002, 2006; Van Dijk & Hacker, 2003; Selwyn, 2004, pp. 341–362; 2011). Relying on the theoretical framework of the resources and appropriation theory and second-level digital divide research, this study explores questions on how the digital divide can predict MOOC learners' different levels of engagement with ICTs.

3. Resources and appropriation theory

The resources and appropriation theory focuses on van Dijk's (2005, 2013) digital divide scholarship about the dissemination, acceptance, and adoption of new technologies. Based on this theory, Van Dijk (2013) argues that

> *When sufficient motivation is developed one should be able to acquire physical access to a computer, the Internet or another digital medium. Additionally, one needs the material resources to keep using the technology that consists of peripheral equipment, software, ink, paper, subscriptions and so on. Having physical and material access does not automatically lead to appropriation of the technology as one first has to develop several skills to use the medium concerned. The more these skills are developed the more appropriate use can be made of the technology in several applications. The concept of usage can be measured, among others [,] by the observation of the frequency of usage*

and the number and diversity of application (p. 34).

Van Dijk (2005, 2013) noted that unequal distribution of resources is the result of categorical inequalities in the society and causes unequal access to digital technologies. This unequal access depends on the characteristics of these technologies and brings about unequal participation in society, which, in turn, increases categorical inequalities as well as unequal distributions of resources. The author demonstrated a number of personal and positional relational categories that create conditions of unequal access. Personal relational categories are related to individuals' physical or mental properties, such as gender (male/female), age (young/old), ethnicity (majority/minority), cleverness (cognitive/emotional/social), personality (extrovert/introvert; self-confident/not self-confident), and health (abled/disabled). Positional relational categories are related to specific positions in the division of labor (entrepreneur/worker; management/employee; employed/unemployed), in households (family/single person), in education (high/low), and inside or between countries (inside: city/rural area, citizen/migrant; between: developed/developing). According to van Dijk (2005, 2013), inequalities that are based on these categories are considered fully social. He also mentioned that the empirical research of the digital divide distinguishes four kinds of access: motivation (motivation to use digital technology); physical and material access (possession of or permission to use computers and Internet connections); digital skills (possession of operational, informational, and strategic digital skills); and usage (usage time; number and diversity of applications). So, in addition to van Dijk's theory, this study draws on the theoretical framework of the second-level digital divide research, which we discuss in the following sections.

4. The second-level digital divide

The digital divide is a social problem that refers to a technology gap between minority and poor families who are less likely to have access to computers or the Internet compared with other families (Attewell, 2001). The digital divide recognizes inequalities in Internet access across several distinctions, including wealth, gender, ethnicity, and rural and urban differences. It also focuses on the exclusion of minorities, individuals with disabilities or lower education and income, or the elderly from Internet access (Hoffman & Novak, 1998; McConnaughey, Nila,; Sloan, 1995; Norris, 2001). In the mid-1990s, when the Internet emerged as a mass medium, several social scientists and policy makers worried about the unequal dissemination of Internet access. At the beginning, researchers thought that equality to Internet access can be achieved by reducing its cost (DiMaggio & Hargittai, 2001). However, many researchers observed that individuals who had higher income and education and greater access to other resources used the Internet more than others, which might cause other manifestations of inequality (Anderson, Bikson, Law, & Mitchell, 2001; Goslee & Conte, 1998; Hoffman & Novak, 1998, 1999; Norris, 2001; Strover 1999).

Since 2000, research on the digital divide gap has shifted from the gap in computer and Internet access to unequal digital skills and usage opportunities. As Internet access has become widespread, the focus of the digital divide shifted from inequalities between people with (haves) and without (have-nots) Internet access to inequalities in digital skills and usage opportunities among individuals who are online (DiMaggio, Hargittai, Celeste, & Shafer, 2004; Livingstone & Helsper, 2007; Van Dijk, 2006). A more comprehensive approach, which is called a second-level digital divide, has emerged to investigate and distinguish different levels of online skills among individuals. In this context, skill is defined as the capability to access information effectively and efficiently on the Internet (Hargittai, 2002). According to Van Dijk (2002, 2006, 2013), since the year 2002, more researchers have suggested additional expressions such as “redefining the digital divide” and “beyond access” and added the concepts of digital skills, technology use and applications, or competencies and media. van Deursen and Helsper (2015) argue that Internet users with higher social status benefit and achieve more from digital engagement than their less socioeconomically fortunate counterparts. Based on a Bourdieuian framework of digital inequality, Robinson (2009) noted that “use of the internet may not only replicate offline inequalities but can also accentuate the impacts of disadvantage” (p. 505).

For individuals, MOOCs present a new opportunity to be part of an online learning community and their low barrier to entry encourages those who may lack the ability to attend classes or cannot afford more traditional college opportunities (Thompson, 2011). For instance, female students at some universities in the Arab region are not allowed to be on campus after working hours or during weekends, and therefore have limited chances to make the best use of online courses offered via efficient on-campus Internet connections (AlMegren & Yassin, 2013; Bhatti, El-Qawasmeh, & Tubaisahat, 2005). However, one of the questions about MOOCs is to what extent are these individuals ready for them? Akaslan and Law (2011) argue that success in an online learning environment depends on a cluster of factors and readiness is among the important ones. Dray et al. (2011) noted that investigating learner readiness for online learning can be accomplished by assessing learner level of engagement with ICTs and understanding learner characteristics; this will be achieved in this study by measuring MOOC learner engagement with ICTs, self-efficacy, and locus of control.

By integrating the resources and appropriation scholarship with second-level digital divide research, this study explores questions of how the digital divide in different regions can predict learners’ different levels of engagement with ICTs. Based on the above-mentioned factors, the following research questions are asked:

RQ1 What are some similarities and differences among MOOC learners from different regions in terms of levels of engagement with ICTs, self-efficacy, and locus of control?

RQ2 To what extent does gender moderate the relationship between region and MOOC learner ICTs engagement?

Table 1
Description of the five surveyed MOOCs.

No.	Course Subject	Course and Survey Language	Course Length	Semester	No. of Primary Instructors	No. of Enrolled Learners	No. of Completed MOOC learners/ Certificates Issued	No. of Survey Participants	Retention Rate	Response Rate
1	Computer Science	English	Fifteen weeks	Spring	Two	28,338	1225	2450	4.3%	8.6%
2	Arts and Culture	Arabic	Five weeks	Fall	One	7054	1591	310	22.6%	19.5%
3	History	Arabic	Thirty weeks	Fall	One	2844	138	78	4.9%	56.5%
4	Arts and Culture	Arabic	Five weeks	Fall	One	4749	295	212	6.2%	71.9%
5	Education and Technical Education	Arabic	Sixteen weeks	Fall	One	3748	480	148	12.8%	30.8%

5. Method

The source of data includes surveys from students enrolled in any of the selected five MOOCs, which were taught in English and Arabic during the same year. These respondents serve as a convenience sample. The English MOOC was offered in the spring semester by a large southwestern university in the United States via edX, a U.S.-based MOOC provider. The four Arabic MOOCs were offered in the fall semester by Arab professors and professionals through Rwaq, a Saudi Arabia-based MOOC provider. Both English and Arabic MOOCs were open for any learner to enroll in without any cost or restrictions, and at any time during the course duration. The five MOOCs cover various subject matters and the course duration ranged from five to thirty weeks (see Table 1). This study relies on a comparative case study design to investigate readiness for online learning among learners from different nations, cultures, or aspects of background.

Employing Qualtrics, an online survey software, the survey was conducted online only. To reach a diverse and wide representation of subjects, an email announcement with the survey link was sent to learners who enrolled in any of the five MOOCs. All learners received the email and were encouraged to participate in the study despite whether: they enrolled at the beginning of the course or later on, they were active in it, or completed it. Originally, the survey was designed in English and then translated into Arabic by two native Arabic speakers. Before conducting the surveys, both the English and Arabic surveys were submitted and approved by the Institutional Review Board (IRB) at a southwestern university in the United States.

As shown in Table 1, the total number of enrolled learners in the English MOOC was 28,338 and the number of learners who received certificates of achievement was about 1225. To give each learner an equal opportunity to participate in the English survey, it was sent to the 28,338 learners. The total number of the survey participants was 2450. However, 361 of these cases were deleted due to invalid data. To fulfill the IRB requirements, responses of learners who were less than 18 years old by the time the survey was conducted were deleted from the dataset (47 cases). Responses, which did not include answers for the survey questions (295 cases) or a few answers and for the demographic questions mainly (19 cases), were deleted.

For the Arabic MOOCs, the total number of enrolled learners in the four MOOCs was 18,395 and 2504 of them received certificates of achievement (see Table 1). An email announcement with the Arabic survey link was sent to all learners enrolled in any of the four MOOCs offered in Arabic through Rwaq. The number of learners who received the announcement was 18,395 and of this number 970 participated in the survey. Nevertheless, 177 cases were deleted due to invalid data. Responses of learners who reported an age of less than 18 years by the time the survey was conducted (28 cases) or did not include answers for the survey questions (149 cases) were deleted from the dataset.

The number of learners who did not drop out and remained active until the end of the course was much less than the initial number. The retention rates of the five MOOCs diversified from 4.3 percent to 22.6 percent (see Table 1). These retention rates fall within typical MOOC retention rate range. For instance, Reich (2014) mentioned that the typical MOOC retention rate ranges from 2 to 10 percent and according to Koller, Ng, Do, and Chen (2013), it is about 5 percent. Data illustrated in Table 1 demonstrate that the response rates of the English and Arabic surveys varied from about 9 percent to 72 percent. Generally, this rate was calculated by dividing the number of learners who filled out the survey by the number of learners receiving certificates of achievement, except for the English MOOC; only the response rate of this MOOC was calculated differently by dividing the number of learners who filled out the survey by the number of enrolled learners, since more learners filled out the survey than those who received certificates of achievement. Apart from the English survey, the response rates were close or higher than the typical response rate (19.8%) for web-only surveys without response incentive (Sax, Gilmartin, & Bryant, 2003), which was the case in this study as participants were not offered any incentives. Studies that surveyed MOOC learners online reported low response rates (van de Oudeweetering & Agirdag, 2018). For example, Christensen et al. (2013) and Liu et al. (2014) reported response rates of 8.5 percent and 8 percent respectively. It is worth mentioning that in order to protect participants' anonymity, survey responses were not linked to participants' records with respect to whether they received a certificate of achievement or not.

5.1. Profile of MOOC learners

Data provided in Table 2 show information about the demographics of the MOOC learners who participated in the English and Arabic surveys.

5.2. Profile of the English survey learners

For participants who took the English survey, nearly 41 percent of them live in the United States, followed by learners who live in India (8.7%), Brazil (3.7%), United Kingdom (3.3%), and Canada (2.7%). As illustrated in Table 2, the majority of the participants were full-time working professionals (45.4%), followed by college or university students (16.3%), and non-working participants (13.3%).

5.3. Profile of the Arabic survey learners

With respect to participants who took the Arabic survey, 27 percent of the participants live in Saudi Arabia, followed by participants who live Egypt (23.7%), Syria (10.6%), Morocco (6.4%), Yemen (6.3%), and Algeria (5.1%). About 35 percent of the subjects were full-time working professionals (see Table 2), followed by college or university students (25.1%), and non-working participants (13.9%).

Table 2
English and Arabic survey learner demographics.

Measures and items	English Survey		Arabic Survey	
	Frequency	Percentage	Frequency	Percentage
Age				
Under 25	413	19.8	263	38.6
25-35	697	33.4	298	43.8
36-49	498	23.8	105	15.4
50 or older	481	23.0	15	2.2
Gender				
Male	1774	85.2	407	59.6
Female	308	14.8	276	40.4
Highest level of education				
Middle/High school	237	11.4	106	15.5
Some College	242	11.6		
Two-Year College/Higher Technical Education	107	5.1	142	20.8
Bachelor's degree	688	33.0	311	45.5
Professional/Master's/doctoral degree	809	38.8	124	18.2
Primary occupation				
Non-working	278	13.3	97	14.1
High school student	43	2.1	12	1.7
College/university student	341	16.3	175	25.4
Graduate student	174	8.3	38	5.5
Part-time working professional	96	4.6	35	5.1
Full-time working professional	949	45.4	237	34.4
Self-employed/consultant	202	9.7	88	12.8
Other	6	0.3	6	0.9

5.4. Measures

The survey questionnaire items were adopted from a survey instrument developed by Dray et al. (2011) to assess student readiness for online learning called the Online Learning Readiness Survey (OLRS). Dray et al. (2011) employed a three-phase approach to verifying an instrument to measure learners' readiness for online learning. The first two phases involved developing and reviewing a survey of experts, followed by focus groups and interviews. In the third phase, 501 undergraduate and graduate students participated in the validation of the survey. Recent studies of learners' readiness to engage in online learning have cited this scale (Blayone, Mykhailenko, & Barber, 2018; Demir & Yurdugül, 2015; Mathews & Bhanugopan, 2014; Parkes, Stein, & Reading, 2015; Seiver & Troja, 2014; van Rooij & Zirkle, 2016; Wladis & Samuels, 2016), while others have adapted items for their research (Abdous, 2019; Bhalla, Durham, Al-Tabaa, & Yeager, 2016).

After getting permission from the survey instrument authors to use it and revise the questions, we made minor changes to some of the questionnaire items to ask specifically about MOOCs, instead of online courses in general. According to Dray et al. (2011), the survey has a relationship to the ICTs subscale that we refer to as "ICTs engagement", and a learner characteristics scale that includes two subscales: self-efficacy and locus of control. To answer the proposed research questions, several groups of variables were tested as dependent, independent, and control variables. Each questionnaire item was measured on a four-point Likert-type scale. The values of the scale ranged from 1 = strongly disagree to 4 = strongly agree.

The process of aggregating the questionnaire items into the abovementioned four dependent variables involved employing exploratory factor analysis (EFA) and confirmatory factor analysis (CFA).

ICTs Engagement. To measure the participants' levels of engagement with ICTs, we relied on the relationship to ICT subscale of Dray et al. (2011) relationship to ICT subscale. The instrument has nine items, which included: "when I have to look up information on the Internet for any reason, I am comfortable with the task"; "when reviewing information on the Web, I am confident that I am aware of author bias and point of view"; and "when asked to download audio or video from email and view or listen to it on my computer (e.g. files sent from someone else) I feel anxious about my ability to complete the task." Since four of questions were negatively phrased, the responses of these items were reverse coded in the analysis. Based on the factor analysis in this study, five items comprise the ICTs engagement variable with an $\alpha = .75$, $M = 3.22$ and $SD = 0.62$.

Self-Efficacy. We utilized the self-efficacy subscale of Dray et al. (2011) to measure the participants' self-efficacy. The subscale consists of six items and included: "I am comfortable expressing my opinion in writing to others"; and "I am good at completing tasks independently". Based on the factor analysis, five items comprise the self-efficacy variable with an $\alpha = 0.81$, $M = 3.16$, and $SD = 0.50$.

Locus of Control. To access the participants' locus of control, we used the Dray et al. (2011) locus of control subscale, which has four items and included: "I organize my time to complete course requirements in a timely manner"; and "I achieve goals I set for myself." According to the study's factor analysis, the four items comprise the locus of control variable with an $\alpha = 0.71$, $M = 3.07$, and $SD = 0.49$.

Region. Participants of the English and Arabic surveys were asked what country they live in and Table 3 shows the details of all the

Table 3
List of regions.

Measures and items	English Survey (edX)						Arabic Survey (Rwaq)					
Region	Frequency	Percentage	Male		Female		Frequency	Percentage	Male		Female	
			(*N*)	%	(*N*)	%			(*N*)	%	(*N*)	%
North America	906	43.8	743	82.5	158	17.5	0	0	0	0.0	0	0.0
Europe	417	20.1	371	89.0	46	11.0	17	2.6	9	52.9	8	47.1
Asia and the Pacific	392	18.9	333	85.2	58	14.8	0	0	0	0.0	0	0.0
Latin America and the Caribbean	229	11.1	202	88.2	27	11.8	0	0	0	0.0	0	0.0
Commonwealth of Independent States (CIS)	60	2.9	48	81.4	11	18.6	0	0	0	0.0	0	0.0
Africa	33	1.6	29	87.9	4	12.1	14	2.1	12	85.7	2	14.3
Arab States	33	1.6	29	87.9	4	12.1	625	95.3	362	58.6	256	41.4

participants' regions; however, in order to conduct a comparative analysis between regions, the ones where few participants live were excluded from the analysis.

Gender. Respondents were asked about their gender and, as shown in Table 2, nearly 85 percent of the English survey participants were male (85.2%), where the percentages of male and female respondents to the Arabic survey were closer, 60.3 percent and 39.7 percent, respectively.

Level of education. Participants were asked about the highest levels of education they completed and many of the English and Arabic survey participants, (71.8%) and (63.3%), respectively, had a bachelor's degree or higher (see Table 2).

Age. Respondents were asked in what year they were born and were categorized accordingly into the following four age groups: under 25, 25–35, 36–49, and 50 or older. About 33 percent of English survey participants were between 25 and 35 years old and 19.8 percent were under 25 years old. Around 44 percent of Arabic survey participants were between 25 and 35 years old and 38.6 percent were under 25 years old (see Table 2).

6. Data analysis and results

6.1. Statistical analysis for the OLRS

In this study, data were analyzed using IBM SPSS Statistics. Descriptive analysis was used to summarize the respondents' demographic data and several univariate general linear regression model (GLM) tests were employed to answer RQ1 and RQ2. Since this study analyzes a large sample size ($N = 2882$), normality assumption is not a concern, because regression is fairly robust to its violation (Keith, 2015; Kline, 1998).

6.2. Effects of region on MOOC learner ICTs engagement, self-efficacy, and locus of control

The first research question investigates similarities and differences among MOOC learners from different regions in regard to levels of ICTs engagement, self-efficacy, and locus of control. Three univariate general linear regression model (GLM) tests with region as a fixed factor and the ICTs engagement, self-efficacy, and locus of control factors as dependent variables in each separate test were conducted to investigate the effect of region on each dependent variable. To account for the possible confounding of variables in the three tests, age, level of education, and gender were included as fixed factors. The tests of the main effects were examined. After running each of the univariate GLM tests, follow-up Tukey's post-hoc tests were performed to explore the pairwise differences among the adjusted means for the different regions.

6.3. Region and MOOC learner ICTs engagement

As illustrated in Table 4, while controlling for the effects of level of education, age, and gender, the main effect of region on

Table 4
Effects of region on MOOC learners' ICTs engagement, self-efficacy, and locus of control.

Dependent Variables	ICTs Engagement		Self-Efficacy		Locus of Control	
	F	η2	*F*	η2	*F*	η2
Region	$F(4, 2526) = 30.56^{***}$	.05	$F(4, 2526) = 24.47^{***}$	.04	$F(4, 2526) = 16.14^{***}$	.03
Level of education	$F(4, 2526) = 7.04^{***}$	.01	$F(4, 2526) = 6.42^{***}$	.01	$F(4, 2526) = 6.77^{***}$	.01
Age	$F(3, 2526) = 3.06^{*}$	< .01	$F(3, 2526) = 1.73$	< .01	$F(3, 2526) = 3.86^{**}$	.01
Gender	$F(1, 2526) = 6.48^{*}$	< .01	$F(1, 2526) = 10.10^{**}$	< .01	$F(1, 2526) = 2.03$	< .01

Note: $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

Table 5
Regions and estimated marginal means of MOOC learner ICTs engagement, self-efficacy, and locus of control.

Region	ICTs Engagement	Self-Efficacy	Locus of Control
	Mean (SE)	Mean (SE)	Mean (SE)
Europe	3.35 (0.03)	3.01 (0.03)	3.05 (0.03)
North America	3.30 (0.03)	3.25 (0.02)	3.16 (0.02)
Asia and the Pacific	3.10 (0.04)	3.02 (0.03)	3.03 (0.03)
Arab States	3.11 (0.03)	3.12 (0.02)	2.95 (0.02)
Latin America and the Caribbean	2.89 (0.04)	3.04 (0.03)	3.14 (0.03)

Note: The values of each subscale ranged from 1 = strongly disagree to 4 = strongly agree.

MOOC learner ICTs engagement was significant, $F(4, 2526) = 30.56$, $p < .001$. As seen in Table 5, follow-up tests indicated significant differences among learners who live in the Arab States region and the European, Latin American and the Caribbean, and North American regions. For instance, learners who live in Arab States have significantly lower levels of engagement with ICTs than learners who live in North America and Europe and significantly higher levels than learners who live in Latin America and the Caribbean. However, there was no significant difference between learners who live in Arab States and Asia and the Pacific. Additionally, there were significant differences between learners who live in North America and learners who live in Asia and the Pacific and Latin America and the Caribbean, but no significant difference between learners who live in North America and Europe. Learners who live in North America have significantly higher levels of engagement with ICTs than learners who live in Asia and the Pacific and Latin America and the Caribbean. Learners who live in Europe have higher levels of engagement with ICTs than learners who live in Asia and the Pacific and Latin America and the Caribbean. Learners who live in Asia and the Pacific have significantly higher levels of engagement with ICTs than learners who live in Latin America and the Caribbean. Furthermore, the effects of the control variables, level of education, age, and gender, on MOOC learner ICTs engagement were significant (see Table 4). Learners who have at least some college, who are between the age group 25–35 years, and male learners have higher levels of engagement with ICTs than do other learners.

6.4. Region and MOOC learner self-efficacy

As demonstrated in Table 4, while controlling for the effects of level of education, age, and gender, the main effect of region on MOOC learner self-efficacy was significant, $F(4, 2526) = 24.47$, $p < .001$. As seen in Table 5, follow-up tests indicated significant differences among learners who live in the North American region and learners who live in the Arab States and Europe, Asia and the Pacific, or Latin American and the Caribbean regions. Learners who live in North America have significantly higher self-efficacy than learners who live in Arab States, Europe, Asia and the Pacific, and Latin America and the Caribbean. Moreover, the effects of the control variables, level of education and gender, on MOOC learner self-efficacy were significant, but the effect of age was not (see Table 4). Learners who have a professional, master's, or doctoral degree, and male learners have higher self-efficacy than do other learners.

6.5. Region and MOOC learner locus of control

As illustrated in Table 4, while controlling for the effects of level of education, age, and gender, the main effect of region on MOOC learner locus of control was significant, $F(4, 2526) = 16.14$, $p < .001$. As seen in Table 5, follow-up tests indicated significant differences among learners who live in the Arab States region and the North American, European, and Latin American and the Caribbean regions. Learners who live in Arab States have significantly lower locus of control than learners who live in North America, Europe, and Latin America and the Caribbean; however, there was no significant difference between learners who live in Arab States and Asia and the Pacific. Furthermore, learners who live in North America have significantly higher locus of control than learners who live in the two regions Europe and Asia and the Pacific, but no significant difference between learners who live in North America and Latin America and the Caribbean. There were no significant differences between learners who live in Europe and Asia and the Pacific or Europe and Latin America and the Caribbean. There was no significant difference between learners who live in Asia and the Pacific and Latin America and the Caribbean. In addition, the effects of the control variables, level of education and age, on MOOC learner locus of control were significant, but the effect of gender was not (see Table 4). Learners who have a professional, master's, or doctoral degree and who are 50 years old and older have higher locus of control than do other learners.

7. Effect of gender

The second research question examines whether the effect of region on MOOC learner ICTs engagement differs between genders. A univariate general linear regression model (GLM) test with region as a fixed factor and ICTs engagement as a dependent variable was conducted to investigate the effect of gender. To account for the possible confounding of variables in the test, the variables of age, level of education, and gender were included as fixed factors. Tests of two-way interaction and main effects were examined. After running the univariate GLM test, significant two-way interaction was followed up with profile analysis to evaluate the pairwise

Table 6
Effect of gender on the relationship between region and MOOC learner ICTs engagement.

Dependent Variables	ICTs Engagement	
	F	η2
Region	$F(4, 2522) = 11.44^{***}$	.02
Region x Gender	$F(4, 2522) = 3.75^{**}$	.01
Level of education	$F(4, 2522) = 7.39^{***}$	.01
Age	$F(3, 2522) = 3.30^{*}$	< .01
Gender	$F(1, 2522) = 0.89$	< .01

Note: $^{*}p < .05$; $^{**}p < .01$; $^{***}p < .001$.

differences among the adjusted means for male and female MOOC learners.

7.1. Effect of gender on the relationship between region and MOOC learner ICTs engagement

As shown in Table 6, while controlling for the effects of level of education, age, and gender, the interaction between region and gender on MOOC learner ICTs engagement was significant, $F(4, 2522) = 3.75$, $p < .01$. Follow-up tests revealed that MOOC male learners who live in North America, Asia and the Pacific, and Latin America and the Caribbean have significantly higher levels of engagement with ICTs than female learners. However, female learners in Latin America and the Caribbean have significantly higher levels of engagement with ICTs than male learners. There was no significant difference between male and female learners who live in Arab States or Europe (see Fig. 1).

8. Discussion

The analysis of the survey results demonstrates that the effect of region on MOOC learners' ICTs engagement was significant. Learners who live in the North American regions have significantly higher levels of engagement with ICTs than learners who live in Arab States, Asia and the Pacific, and Latin American and the Caribbean regions. Learners who live in Arab States have significantly lower levels of engagement with ICTs than learners who live in the European region and significantly higher than learners who live in Latin America and the Caribbean. On the other hand, the difference between learners who live in North American and European regions was not significant and the difference between learners who live in Arab States and Asia and the Pacific was not significant. These findings indicate that the MOOC learner level of engagement with ICTs differs depending on the country they live in and most

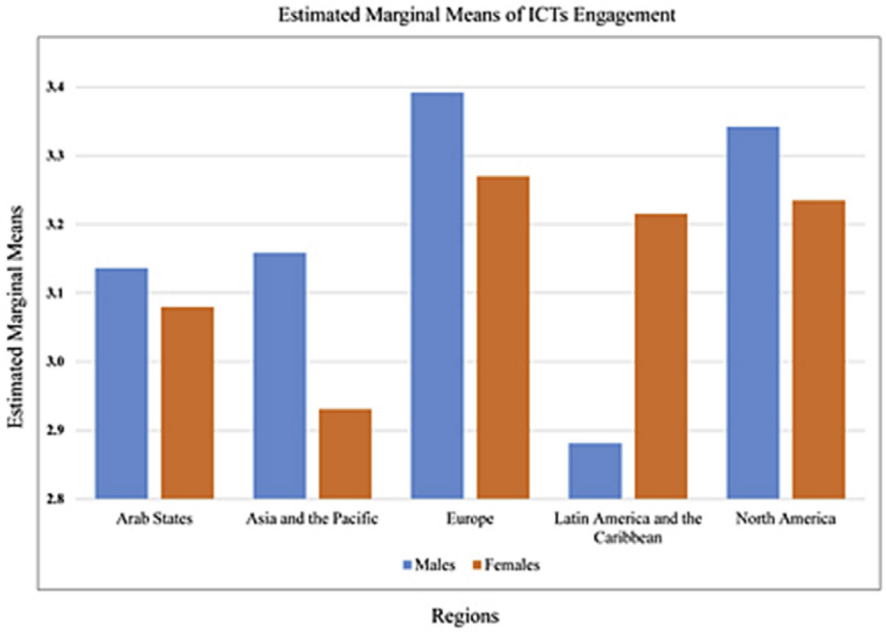

Fig. 1. Estimated Marginal Means of MOOC Learner ICTs Engagement by Region and Gender. *Note.* The number of survey participants who live in the Arab States = 625 (24.3%), Asia and the Pacific = 392 (15.3%), Europe = 417 (16.2%), Latin America and the Caribbean = 229 (8.9%), and North America = 906 (35.3%).

of these differences were significant.

These findings support the resources and appropriation theory and second-level digital divide research (Hargittai, 2002; Van Dijk, 2002, 2005, 2006, 2013), since they demonstrate how MOOC learners, who all have access to the Internet, do not possess the same digital skills and how differences in ICTs diffusion can contribute to individuals' digital skills. Additionally, these findings are consistent with previous research. Mirza and Al-Abdulkareem (2011) noted that many countries within the Middle East region were generally reluctant to adopt the Internet. On the other hand, in the U.S., for example, in 2001 more than half of the population was online ("A Nation Online," 2002). According to Hargittai (2002), the length of time people have been Internet users contributes to their digital skills and abilities to navigate the content of the Internet and therefore the time spent on the Internet is associated with users' Internet skills. Less digitally skilled users might be discouraged to use the Web because of the challenges they encounter trying to find information on the Internet. As the findings of this study indicate, MOOC learners who live in countries that were late in adopting the Internet might have significantly lower levels of engagement with ICTs than learners in countries that were faster in adopting the Internet. One of the arguments about MOOCs is that "because MOOCs are free, anyone with an internet connection can learn valuable information from them that can make them a better, more knowledgeable person" ("The future of MOOCs," 2015). However, the study findings counter this statement, considering they show how MOOC learners possess significantly different digital skills. For this reason, educators should not assume that all MOOC learners possess the same technological competence or literacy and all are able to learn and benefit from MOOCs.

The results also indicate that the effect of region on learner self-efficacy was significant. For example, learners who live in North America have significantly higher self-efficacy than learners who live in the Arab States, Europe, Asia and the Pacific, and Latin America and the Caribbean; the differences between learners who live in Arab States and the other three regions were not significant. Although the findings show that MOOC learners' self-efficacy differs depending on the country in which they live, only learners who live in North America have higher self-efficacy. Moreover, the results indicate that the effect of region on learner locus of control was significant. For instance, learners who live in North America have significantly higher locus of control than learners who live in the Arab States, Europe, and Asia and the Pacific. Learners who live in Arab States have significantly lower locus of control than learners who live in Europe and Latin America and the Caribbean. However, the differences between learners who live in the North American and Latin American and the Caribbean regions were not significant. The difference between learners who live in Arab States and Asia and the Pacific was not significant. The findings show that MOOC learners' locus of control might differ from one another depending on the country in which they live, such as the significant difference between learners who live in North America and Arab States.

According to Dray et al. (2011), learner readiness for online learning can be examined by studying learner characteristics (self-efficacy and locus of control) and engagement with ICTs. This study's findings indicate that the effects of region on learner self-efficacy and locus of control were significant. These findings are consistent with previous research. Lim's (2004) study revealed that American students had significantly higher levels of self-efficacy than Korean students. He noted that this significant difference could be accounted for through the work of Chen, Stevenson, Hayward, and Burgess (1995), who suggested that the Asian students they studied were affected by the authoritarian classroom context of Asian culture. A study conducted by Mueller and Thomas (2000) examined locus of control of over 1800 university students in nine countries; they found that individualistic and collectivistic cultures contribute to individuals' locus of control. According to their study, "individualism was found to increase the likelihood of an internal locus of control orientation … while collectivistic cultures do not" (p. 66). Countries in the North American region, such as the U.S. and Canada, tend to score more highly on individualism in Hofstede's cultural dimensions model; the U.S. score is 91, which is the highest in Hofstede's model, and Canada's score is 80 ("Compare Countries," n.d.; Smit, 2012). On the other hand, respondents in countries in the Arab States regions, such as Saudi Arabia and Egypt, tend to produce lower scores on individualism, 25 for both of them ("Compare Countries," n.d.). Therefore, differences in individualism and collectivism among MOOC learners from various regions may explain significant self-efficacy and locus of control differences among learners from different regions. While designing and developing MOOCs, educators should not expect that learners from individualistic and collectivistic cultures would have the same levels of self-efficacy and locus of control. Educators should consider how different cultures contribute to learners' characteristics and how to accommodate these differences as they are developing new MOOCs.

This study also examined to what extent gender moderates the relationship between region and MOOC learner ICTs engagement. The results revealed that gender had a significant effect in three regions. MOOC male learners who live in North America, Asia and the Pacific, and Latin America and the Caribbean have significantly higher levels of engagement with ICTs than female learners who live in these regions. On the other hand, there was no significant difference between male and female MOOC learners who live either in Arab States or in Europe. These findings are partially consistent with previous research. In the U.S., men are a little more engaged in using the Internet than women (Fallows, 2005) and females continue to be less intense and frequent users of the Internet (Ono & Zavodny, 2003). For the differences between men and women in using the Internet in Arab States, in a study conducted by Mubarak (2014) at the University of Khartoum in Sudan, she noted that repressive cultural norms hinder women's opportunities to benefit from ICTs and the stereotype of female students as less skilled than males made them less confident in themselves. So, previous research partly corresponds to this study's findings since MOOC male learners who live in North America and Asia have significantly higher levels of engagement with ICTs than female learners who live in these regions. However, the study finding that there was no significant difference between male and female MOOC learners who live in Arab States is not consistent with Mubarak's (2014) research. Based on this analysis, male and female MOOC learners might have significantly different levels of engagement with ICTs based on the countries in which they live. This is an important issue that educators should consider when designing and developing MOOCs.

8.1. Limitations and further directions

This study is based on data collected from learners who took MOOCs offered through two MOOC providers based in the U.S. and Saudi Arabia. Therefore, the results cannot be generalized to all MOOC learners. It is not certain whether measuring other MOOC learner populations in other venues would generate similar or divergent results. Hence, more research should be conducted among learners who are taking MOOCs offered by other instructors or through other providers in different regions. Furthermore, Dray et al. (2011) surveyed undergraduate and graduate students to validate OLRS. Studies that adapted questions from it (Abdous, 2019; Bhalla et al., 2016) conducted their surveys with college students and military mental health providers. Since the survey instrument has not been used yet in other MOOC studies, the results cannot be generalized to the whole population of MOOC learners. In our research, we did not ask respondents to differentiate between their access to MOOCs through desktop, phone, or other devices. Whether the platform of access has any effect on learning or satisfaction would be a useful question for further research.

9. Conclusion

Online learners need to acquire certain skills to succeed in MOOCs. By surveying learners who enrolled in five Arabic and English MOOCs offered through two platforms, we found significant differences among learners who live in five different regions. MOOC learners who live in certain regions have significantly higher levels of engagement with ICTs, self-efficacy, and locus of control than learners who live in other regions. Additionally, in three of five regions, gender has a significant effect as male learners have higher levels of engagement with ICTs than females. Accordingly, for MOOC educators to better help learners succeed in their courses, they should take into consideration the country the learner lives in and their gender.

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