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MOOCs Readiness: The Scenario in Malaysia

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Abstract

This study seeks to investigate the readiness levels of adult students studying in Malaysian higher education institutions. The online questionnaire used in this study consists of 18 demographic variables and 43 items based on six constructs: technical competencies, communication competencies, social competencies, self-efficacy, self-directedness, and readiness. With a sample of 413 respondents, the constructs were evaluated using measures based on students' self-identification with each item. Descriptive statistics depict competency, demographic profile of students, and level of readiness. The statistical analyses used for this study were Pearson correlation, multivariate analysis of variance, and structural equation modelling. All six constructs were reliable with Cronbach's alpha (α) above 0.7. Findings indicate that self-efficacy was significant for massive open online course readiness, and additional factors that could influence this readiness are explored. The findings from this study provide important input towards designing effective massive open online courses.

Keywords: massive open online course, readiness, competency, self-efficacy, self-directedness, MOOC

Introduction

The Malaysian Ministry of Education (MOE) in its 2015 education blueprint stated its support for the inclusion of massive open online courses (MOOCs) in tertiary education as a strategy to improve the quality of teaching and learning in the country. In addition to the introduction of a new mode of learning, Malaysian MOOCs would foster healthy competition in teaching and learning among the country's academics and create opportunities for global online learning (MOE, 2015). The most recent development in the use of MOOCs in Malaysia is the publication of the Guideline on Credit Transfer for MOOC by the Malaysian Qualifications Agency (MQA) (MQA, 2016). The establishment of such an environment which supports the use of MOOCs by the government offers a great advantage to the building of the nation's education infrastructure.

The history of MOOCs has its origin in a number of initiatives. At present, there are various forms of MOOCs including the widely known cMOOC and xMOOC. The former is based on the connectivism learning theory: a learning theory drawn from the digital age which was incidentally developed by Downes and Siemens who created the first cMOOC (Sokolik, 2014). The term MOOC has many definitions in literature due to its historical development as independent open access course and widened interest. The European Association of Distance Teaching Universities define MOOCs as "online courses designed for a large number of participants, that can be accessed by anyone, anywhere as long as they have an Internet connection, are open to everyone without entry qualifications, and offer a full/complete course experience online for free" (Jansen & Schuwer, 2015, p. 4). A shorter description of the term MOOC is provided by Sokolik (2014), who describes the MOOC as a: massive (large enrolment in thousands), open (free and not dependent on location, age etc.), online (entirely digital), course (not just depository of materials but structured syllabi with a schedule and the guidance of an instructor). A MOOC can exist as a purely online course involving a community of learners or as a blended mode which brings forth the role of an educator such as in the xMOOC (Sokolik, 2014). A MOOC can also include a certification process that may or may not incur charges. There are also claims of MOOCs with a number of features that may not necessarily represent the aforementioned definition.

According to Eynon (2014), students choose to enrol in MOOCs for a myriad number of reasons, including: intellectual challenge, professional development, and curiosity (as cited in Christensen et al., 2013; Milligan, Littlejohn, & Hood, 2016; Skrypnyk, de Vries, & Hennis, 2015). For institutions of higher learning, benefits of offering MOOCs include the way in which MOOCs: support institutional visibility by enabling institutions to reach out to new students (Porter & Beale, 2015), provide opportunities for academics to be involved in online pedagogy (Jenner & Strawbridge, 2015), and provide course developers the opportunity to collaborate to enhance programme quality (Pscheida et al., 2015). Involvement in MOOCs may also mean heavy investment on new online platforms for many countries (Roland, Uytterbrouck, & Emplit, 2015).

A report by the Department for Business Innovation and Skills, UK, suggests that amidst the benefits of online learning, are huge challenges for existing higher education institutions, especially in the context MOOCs (Haggard, 2013). Some studies suggest that only a small number of students actually complete courses (Koller, Ng, Do, & Chen, 2013; Lee & Choi, 2011; Seaton, Bergner, Chuang, Mitros, & Pritchard, 2015) and that the impersonality of MOOCs leads to students feeling isolated, lonely, and not connected (Kilgore & Lowenthal, 2015). The need for students to be responsible for their own learning is naturally

much greater in MOOCs. The importance of support for successful online learning experiences is emphasised in a 2004 study by Zawacki-Richter, who found that the form and extent of support varies from one student to another. In his research, Tinto (1998) found that enriched student-faculty and student-student interactions could enhance students' sense of belonging and lessen feelings of isolation. Factors such as computer skills or accessibility to the Internet can also determine successful online learning (Selim, 2007). The diversity of MOOC students makes it necessary to not only enhance technical competencies, but also enhance the social and communication competencies to ensure better learning experiences (Roca et al., 2018)

The aforementioned concerns have led research in gauging the readiness of students undertaking a MOOC (Sa'don, Alias, Nakanishi, & Atan, 2017). The appropriateness of assessing readiness for students embarking on online courses is recommended by King and Alperstein (2015). In their research, Kpolovie and Iderima (2016) define the "readiness" of a student as the skills and the behaviour that a student ought to have in order to be successful in his or her learning, and thus suggest that a lack of readiness to learn by the student may have a negative impact on their learning process. The need for students to be ready for learning within the context of MOOCs is further accentuated by the fact that students and teachers are separated by time, distance, and space (Kpolovie & Iderima, 2016).

The purpose of this paper is to discover the state of MOOCs readiness among Malaysian adult students using students' self-identification with specific competencies.

Literature Review

Measuring MOOCs readiness can be likened to identification of the prerequisites to the MOOC's enrolment, which is based on required competencies that would enable a student to pursue a course and complete the associated learning tasks. According to the International Board of Standards for Training, Performance, and Instruction (IBSTPI, 2000), competency is "knowledge, skills, or attitudes that enable one to effectively perform the activities of a given function" (p31). Kerka (1998) argues that "competence is individualized, emphasizing outcomes (what individuals know and can do), and allows flexible pathways for achieving those outcomes" (p3). The five major competencies chosen for this study as most significant in effective online learning are: (i) social competency, (ii) technical competency, (iii) communication competency, (iv) self-efficacy, and (v) self-directedness.

Rutherford, Marthur, and Quinn (1998) define social competency as skills of initiating and managing positive social interactions, relationships (friendships), establishing collaborative networks, and coping effectively in social environments. Communication competency is defined by McCroskey and McCroskey (1988) as adequate ability to transfer information through oral or written format. Technical competency refers to knowledge and skills required to perform a specific task or a group of tasks within a specific job scope (Vathanopas & Thai-ngam, 2007). In Yu and Richardson's (2015) Student Online Learning Readiness (SOLR) Model, all three of these types of competencies are recognised as necessary competencies to measure in order to determine the level of readiness for online courses.

The evaluation of readiness for MOOCs can be different from online learning. The feeling of isolation in a massive environment can be daunting. Willis, Spiers, and Gettings (2013) explored the concept of space in MOOCs, and found that self-efficacy, as well as being surrounded in a community of students) in a MOOC can increase student motivation, participation, and achievement. According to Landine and Stewart (1998), self-efficacy involves one's belief that he or she is able to perform a task. The importance of a student community as highlighted in the aforementioned study by Willis, Spiers, and Gettings (2013) further emphasises social and communication competencies as important factors which influence MOOCs readiness. As Bandura (1993) found a positive relationship between self-efficacy and self-directedness, self-directedness may be an additional factor that could influence the level of readiness among MOOC students. Self-directedness in learning refers to the extent students are responsible for their own learning (Kpolovie & Iderima, 2016). Responsible students carry out a number of tasks independently from identifying their learning needs, searching for resources, to self-evaluation (Kpolovie & Iderima, 2016). They show initiative, independence, and persistence in learning (Kpolovie & Iderima, 2016). According to Beaven, Hauck, Comas-Quinn, Lewis, and de los Arcos (2014), the challenges of being self-directed in a MOOC environment for learners is also compounded by their participatory literacy.

The exploration of the concept of MOOCs readiness can shed more light into students' learning readiness in an open and distributed learning environment.

Conceptual Framework of Study

The conceptual framework of this study was adapted from the SOLR Model proposed by Yu and Richardson (2015). As articulated by Yu and Richardson (2015), the SOLR model was created based on the theories of Tinto (1998) and his Student Integration Model (SIM). Tinto (1998) argues that social and academic integration are the most significant factors for student retention in their course. Social integration occurs when a student experience quality of relationship with the course instructor and classmates, while academic integration occurs when a student is able to improve academic performance and level of intellectual development (Tinto, 1998). According to Tinto, students who achieve higher levels of social and academic integration tend to have strong goal and institutional commitments and as a result, tend not to drop out. Therefore, social competency which influences interactions with both instructors and classmates is deemed significant. The SOLR Model proposed by Yu and Richardson (2015) suggests that communication competency enhances students' interactions with instructors and classmates. Yu and Richardson's (2015) SOLR Model also asserts technical competency as a substantial component that would influence student retention in online learning.

The social, communication, and technical competencies proposed in Yu and Richardson's (2015) SOLR Model for online learning are also applicable to a MOOC as it is essentially an online course with additional features (massive and open). The conceptual framework depicted in Figure 1 incorporates the aforementioned competencies, with two additional independent variables: self-efficacy and self-directedness. Zimmerman and Cleary (2006) having studied the relationship between self-efficacy and self-directedness, suggested that interventions to improve these dimensions can lead to vital developmental

transitions. This could help to improve the level of readiness of students to learn through MOOCs successfully.

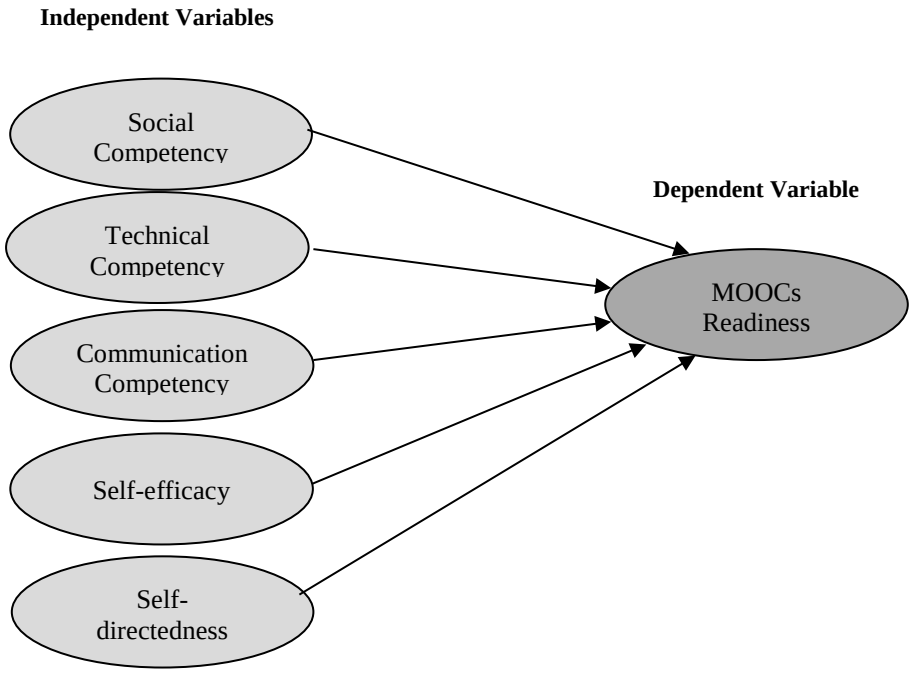

Figure 1. The conceptual framework adapted from "An exploratory factor analysis and reliability analysis of the student online leaning readiness (SOLR) instrument," by T. Yu and J.C. Richarson, 2015, *Online Learning*, *19*(5). Copyright 2015 by the Online Learning Consortium. (https://files.eric.ed.gov/fulltext/EJ1085767.pdf)

Hypotheses

The five hypotheses postulated in this study are:

Hypothesis 1: There is a relationship between social competency and MOOCs readiness.

Hypothesis 2: There is a relationship between technical competency and MOOCs readiness.

Hypothesis 3: There is a relationship between communication competency and MOOCs readiness.

Hypothesis 4: There is a relationship between self-efficacy and MOOCs readiness.

Hypothesis 5: There is a relationship between self-directedness and MOOCs readiness.

Methodology

Sample and Procedure

This study focuses on students in Malaysian higher education institutions, involving students from Open University Malaysia, Malaysian private universities, and other Malaysian public universities such as Universiti Teknologi Malaysia, Universiti Putra Malaysia, and Universiti Malaya, polytechnics and community colleges. A questionnaire was distributed online through Survey Monkey for three months from April to July 2016 using convenience sampling. This resulted in 801 responses, of which 413 were usable. The remaining 388 responses were incomplete with most (more than 90%) questions left unanswered.

Measures

All measures were adapted and modified from published literature. There were three sections in the questionnaire. Section A served to collect demographic information from every respondent including: age, gender, highest level of education, student status, current mode of delivery, type of academic programme, and name of higher education institution. Single item data were also obtained from respondents concerning: access to PC/Laptop/Tablet and Smartphone, access to stable Internet connection, ability to connect files/data and Internet connection anywhere, prior experience attending online courses and/or MOOCs, and intentions to enrol in MOOCs in 2017. One open-ended item was included in the questionnaire to identify factors that influence students' motivations for taking MOOCs. Section B had constructs measured on an Ordinal Scale from 1 (Strongly Disagree) to 4 (Strongly Agree) based on students' self-identification with each item. The constructs measured technical competency, communication competency, social competency, self-efficacy, and self-directedness. Technical competency had nine items, communication competency had six items, social competency had seven items, self-efficacy had five items, and self-directedness had five items. Section C measured the construct of MOOCs readiness on an Ordinal Scale from 1 (Strongly Disagree) to 4 (Strongly Agree) using 11 items. The measurement framework of the questionnaire is summarised in Table 1.

Table 1

Measurement Framework of the Questionnaire

Item	Measurements	Scale	Literature
1-16	Section A Demographic profile Age, gender, highest level of education, student status, current mode of delivery, type of academic programme, name of higher education institution, access to PC/Laptop/Tablet/Smartphone, access to stable Internet connection, ability to connect files /data anywhere, prior experience in online courses, prior experience in MOOCs, intentions to enrol in MOOCs in 2017, and Motivation for taking MOOCs	Nominal scale Open-ended	N/A

17-51	Section B: Competencies		
	Technical competency	1-4 Ordinal scale	(Yu & Richardson, 2015)
	Communication competency	1-4 Ordinal scale	(Yu & Richardson, 2015)
	Social competency	1-4 Ordinal scale	(Yu & Richardson, 2015)
	Self-efficacy	1-4 Ordinal scale	(Mercado, 2008)
	Self-directedness	1-4 Ordinal scale	(Mercado, 2008)
52-62	Section C: MOOCs readiness	1-4 Ordinal scale	(Mercado, 2008)

Statistical Analyses

Statistical Package SPSS (Version 22) for Windows was used to process and analyse the data. Reliability analysis was used to test against the generally acceptable limit based on Cronbach's alpha value of 0.7. Statistical validity tests including composite reliability tests and confirmatory factor analysis (CFA) were carried out. Structural equation modeling (SEM) analysis using AMOS 24.0, which is a comprehensive statistical approach for testing theoretical hypotheses about the relationships among observed and latent variables (Hoyle, 1995) was also carried out. The normality of data were assessed based on the measure of skewness.

Results

Demographic Profile

Respondents in this study were largely (62.2%) students from Open University Malaysia (known as OUM) while the remaining 37.8% were from private and public higher education institutions, polytechnics, and community colleges. As shown in Table 2, the ratio of female to male respondents was 64:36. Respondents between the ages of 18-25 years old account for 22.8% (almost a quarter) of the sample, while respondents between 26-45 years old account for 64.4%. The remaining 12.8% of the sample was made up of respondents above 46 years old. About a quarter of the respondents (24.5%) reported that they were registered with their institutions with a bachelor's degree as their highest level of education. A larger percentage (34.9%) of the respondents reported that they were registered with their institutions with a diploma level, and 129 respondents (31.2%) reported being enrolled with SPM/O-level or equivalent. Less than 10% of the respondents reported having a master's degree. A very small percentage of respondents (less than 2%) stated that they have doctorate/PhD qualification. A large number of respondents reported that they were pursuing academic programmes at the bachelor's level (65.6%), while others were pursuing either a certificate/diploma (9.0%), or postgraduate studies (24.6%). The respondents were categorised as 'undergraduate' and 'postgraduate' students onwards. Almost all respondents (92.5%) reported that they were part-time students. Only a small number of respondents were involved in fully online courses. Some students could have been involved in more than one course with a different delivery mode.

In terms of accessibility to a PC/Laptop/Tablet and a Smartphone, more than 95% answered 'yes'. However, access to stable Internet connection was slightly less (85.0%), whereby about 10% respondents reported having poor Internet connection. 74.8% of students reported being able to connect to their files, data, and Internet connection wherever they are, suggesting a quarter of the respondents are not mobile.

The majority of respondents (70%) reported that they had not taken fully online courses before and an even higher percentage (91.3%) had not enrolled in any MOOC. Although the descriptive data shows that the majority of respondents have limited experience in a fully online course and an even more limited exposure to MOOCs, a large number of respondents (62%) reported that they had plans to enrol in a MOOC in 2017.

Table 2

Demographic Profile of Adult Students

Demographic profile	n	%
Gender		
Male	150	36.3
Female	263	63.7
Age		
18 - 25 years	94	22.8
26 - 35 years	154	37.3
36 - 45 years	112	27.1
46 - 55 years	38	9.2
More than 55 years	15	3.6
Highest level of education		
PMR	3	0.7
SPM/O-levels or equivalent	129	31.2
Diploma	144	34.9
Bachelor's	101	24.5
Master's	30	7.3
Doctorate/PhD	6	1.5
Student category		
Full time	31	7.5
Part time	382	92.5
Current mode of delivery		
Fully online (no face-to-face)	72	17.4
Blended (online and face-to-face)	324	78.5
Not online (face-to-face only)	67	16.2
Academic programme		
Certificate	3	0.7
Diploma	37	9.0
Bachelor's	271	65.6
Master's	80	19.4
PhD	22	5.3
Access to a PC/Laptop/Tablet	404	97.8
Have a smartphone	398	96.4
Access to a stable Internet connection	351	85.0

Able to connect to files/data and the Internet connection wherever	309	74.8
I have taken a fully online course before this semester	124	30.0
I have attended online classes (e.g. virtual classrooms)	125	30.3
I have enrolled in a MOOC	36	8.7
I plan to enrol in a MOOC in 2017	256	62.0

Many respondents (71.4%) reported that their motivation to enrol in a MOOC is derived from a desire to widen their knowledge. Students' interest in pursuing knowledge suggests that students are self-motivated and have a high level of intrinsic motivation. Half of the respondents (51.1%) wished to enrol in MOOCs as a self-initiative towards "continuous professional development." About 50% respondents indicated "exposure to online learning" as their motivation to enrol in MOOCs. Close to 40% of the respondents were motivated by "personal interest," "networking purposes," and "adding value to their resumes." Some respondents (27%) indicated that enrolling in a MOOC was "part of a compulsory course." Around 22% reported "socialising" as their motivation. Lastly, 18 % of respondents were motivated by the need to "gain credit for university entrance." Respondents' motivations to enrol in MOOCs in order of priority are shown in Table 3.

Table 3

Motivation for Enrolling in a MOOC

Enrol in a MOOC course	n	%
To widen knowledge	295	71.4
Continuous professional development	211	51.1
Exposure to online learning	209	50.6
Networking	162	39.2
Personal interest	162	39.2
Added value to resume	141	34.1
Compulsory university course	110	26.6
Socialising	92	22.3
Credit for university course	76	18.4

Descriptive Statistics

Table 4 shows descriptive statistics, including the means, standard deviations, minimums, and maximums of the four factors measured. The items in both social and communication competencies collapsed under a single construct (socio-communication competency). The results show that the highest mean (3.15) is obtained for self-directedness, followed by technical competencies (3.14), socio-communication competencies (3.03), and self-efficacy (2.83). The mean for MOOCs readiness is only 2.64. The results indicate that the respondents are moderately ready for MOOCs, but their level of readiness poses a concern for their ability to learn successfully through MOOCs. The respondents believe they have the competencies and are self-directed. However, the low mean in self-efficacy suggests the need for strategic interventions to improve the construct.

Table 4

Means and Standard Deviations of the Four Factors Influencing MOOCs Readiness

Factors	*M*	SD	Minimum	Maximum
MOOCs readiness	2.64	0.63	1	4
Socio-communication competency	3.03	0.48	1	4
Self-efficacy	2.84	0.63	1	4
Technical competency	3.13	0.47	1	4
Self-directedness	3.15	0.46	1	4

Correlation

The Pearson Correlation Matrix in Table 5 shows correlations between MOOCs readiness and socio-communication competency, technical competency, self-efficacy, and self-directedness. MOOCs readiness is significantly correlated with all four factors. The highest correlation is between MOOCs readiness and self-efficacy (r = 0.553), followed by socio-communication competency (r = 0.511), self-directedness (r = 0.484), and technical competencies (r = 0.440). The relatively low mean in self-efficacy indicated in the previous table raises a concern. Efforts are crucial in identifying the required support and effective mechanisms to raise students' self-efficacy levels toward successful learning through MOOCs. The growing importance of support in online education as well as in MOOCs due to its pedagogical challenges is also highlighted by Zawacki-Richter (2004).

Table 5

Correlation Analysis – Pearson Correlation Matrix

	MOOCs readiness	Socio-communication competencies	Self-efficacy	Technical competencies	Self-directedness
Socio-communication competency	.511**	1			
Self-efficacy	.553**	.646**	1		
Technical competency	.440**	.673**	.540**	1	
Self-directedness	.484**	.722**	.643**	.592**	1

Note. ** Correlation is significant at the 0.01 level (2-tailed).

Multivariate Repeated One-Way Anova (MANOVA)

MANOVA Hotelling's Trace output revealed there is no significant difference between male and female students, and among students of different age groups ($p>0.05$) on MOOCs readiness, as shown in the Table 6. However, there is a significant difference between mode of delivery in the MOOCs readiness dimensions ($F=5.040$, $p<0.000$).

Table 6

F-tests: Gender, Age, and Mode of Delivery on MOOCs Readiness Dimensions

	Value	F value	Hypothesis df	Error df	Sig.
Hotelling's trace					
Gender	.018	1.439[b]	5.000	407.000	.209
Age	.049	.996	20.000	1610.000	.464
Mode of delivery	.124	5.040	10.000	810.000	.000

A follow-up post hoc analysis in Table 7 shows that mode of delivery made a significant difference in mean scores of socio-communication competency ($F=9.91$, $p<0.000$), self-efficacy ($F=21.21$, $p<0.000$), technical competency ($F=8.11$, $p<0.000$), self-directedness ($F=7.42$, $p<0.000$), and MOOCs readiness ($F=13.09$, $p<0.000$). The result shows that students who took blended and fully online courses rated socio-communication competency and technical competency (Scheffe's post hoc analysis, $p<0.000$) significantly higher than students who took face-to-face courses. Students who took fully online courses rated self-efficacy and self-directedness (Scheffe's post hoc analysis, $p<0.000$) significantly higher than students who took blended and face-to-face course. In addition, students who took fully online and face-to-face courses rated MOOCs readiness (Scheffe's post hoc analysis, $p<0.000$) significantly higher than students who took blended courses.

Table 7

Descriptive Statistics and F-test of Mode of Delivery on MOOCs Readiness Dimensions

Variable	*Mean* (SD)			F	Scheffe's Test
	Blended	Fully online	Face-to-face		
Socio-communication	3.03 (0.47)	3.18 (0.47)	2.83 (0.43)	9.91**	(1)>(3), (2)>(3)
Self-efficacy	2.87 (0.60)	3.08 (0.61)	2.44 (0.64)	21.21**	(2)>(1),(3)
Technical	3.15 (0.45)	3.24 (0.45)	2.94 (0.48)	8.11**	(1)>(3), (2)>(3)
Self-directedness	3.15 (0.46)	3.30 (0.42)	3.00 (0.48)	7.42**	(2)>(1),(3)
MOOCs readiness	2.67 (0.61)	2.80 (0.62)	2.31 (0.57)	13.09**	(3)>(1), (2)>(3)

Note. **$p<0.000$.

Structural Equation Modeling (SEM)

In the path diagram of structural equation modeling (SEM), the unobserved variables (exogenous) or factors and error terms operate as independent variables (socio-communication competency, technical competency, self-efficacy, and self-directedness) and MOOCs readiness operate as the observed variables/dependent variables (endogenous). Error values show the extent to which the latent factor does not explain a measured variable.

As shown in Figure 2, the standardised beta estimates for effect of socio-communication competency, self-efficacy, technical competency, and self-directedness on MOOCs readiness are 0.11, 0.31, 0.15, and 0.10, respectively. The measure of correlation between exogenous constructs socio-communication competency and self-efficacy is 0.68; socio-communication competency and technical competency is 0.80; socio-

communication competency and self-directedness is 0.77; self-efficacy and technical competency is 0.63; self-efficacy and self-directedness is 0.71; and technical competency and self-directedness is 0.70. These values indicate that the discriminant validity between exogenous constructs is achieved and the two constructs are not redundant (correlations below 0.85). The coefficient of determination R^2 is 0.36. The figure indicates the contribution of exogenous constructs (socio-communication competency, self-efficacy, technical competency, and self-directedness) in estimating the endogenous construct in MOOCs readiness is only 36%. These results indicate that a large percentage of the variance (64%) remains unknown. In other words, there is a room for exploration of new factors that may significantly influence MOOCs readiness.

The normality for the data assessed using the measure of skewness for every item resulted in an absolute value of less than 0.7, suggesting that the data measured and therefore the constructs are normally distributed.

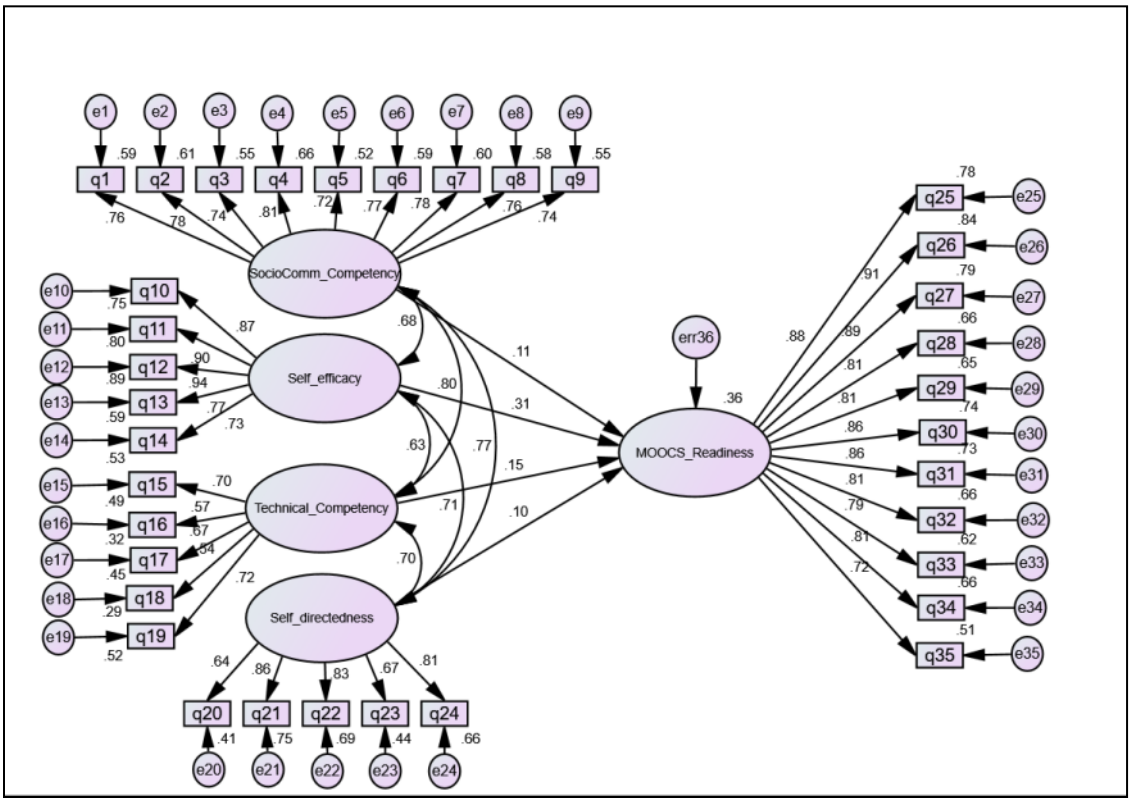

Figure 2. Schematic diagram of model.

Validity and Reliability of Measurement Model

Table 8 shows that factor loading (FL) values exceed 0.50, Cronbach's alpha (CA) values exceed 0.7, and composite reliability (CR) values are above 0.6. The average variance extracted (AVE) values are above 0.5 except for technical competency (0.412). Item analysis can be conducted in future studies to improve the obtained alpha values. It can be concluded that the convergent and discriminant validities of the constructs in the presented model are generally acceptable.

Table 8

Factor Loading, Cronbach's Alpha, Composite Reliability, and Average Variance Extracted

Construct and items	FL	CA	CR	AVE
Socio-communication competency		0.93	0.925	0.744
I am comfortable in responding to other people's ideas	0.742			
I am comfortable in seeking for help when necessary	0.788			
I am able to express myself in a clear manner				
I am able to give constructive feedback to others	0.740			
I am comfortable in expressing my opinion in writing to others	0.815			
I am able to express myself without offending people	0.692			
I am confident in posting my questions online if I do not understand something	0.766			
I am able to connect with others (peers and tutors) with ease	0.781			
I am keen on meeting many new peers in my online course	0.770			
	0.746			
Self-efficacy		0.92	0.925	0.713
I find learning online is highly engaging and interesting	0.867			
I learn well in my online course	0.897			
I am confident that I can perform well in an online course	0.943			
I believe anyone can learn through an online environment	0.766			
I am confident in using ICT system and tools in my studies	0.731			
Technical competency		0.77	0.776	0.412
I am able to download useful resources from the Web	0.697			
I communicate through emails to connect to others	0.565			
I am able to access digital library				
I use social medias to connect to others	0.668			
I am able to collaborate with others through online forums / discussions	0.537			
	0.723			
Self-directedness		0.87	0.876	0.589
I have high expectations for doing well in my studies	0.640			
I set up my learning goals and study plan independently	0.864			
I manage my studies in accordance to my study plan				
I seek assistance when I am unable to solve problems on my own	0.833			
I am independent in seeking for resources and completing my learning tasks	0.665			
	0.809			

MOOCs readiness		0.96	0.961	1.089
I would take up MOOCs if it is equivalent to a conventional course	0.879			
I look forward to engage in MOOCs	0.896			
I like to learn more about MOOCs	0.864			
I would take up MOOCs only if it contributes towards a degree	0.812			
I would take up MOOCs only if they are accredited by the Malaysian Qualifications Agency (MQA)	0.805			
I am ready to enrol in a MOOC	0.868			
I can commit the time needed to complete a MOOC	0.867			
I am prepared to learn in a big group	0.818			
Searching for MOOCs	0.788			
I am open for online assessments	0.817			
I am willing to spend money on MOOCs	0.730			

Table 9 shows that the number of distinct sample moments is 630. Number of distinct parameters to be estimated is 80 and degree of freedom (630-80) is 550. These suggest that the model studied is an over-identified model. The χ^2-to-df ratio is less than 5. Alternative measure of fit is used instead of Chi-square. Absolute fit indices in Table 10 shows goodness of fit, GFI = 0.819, root mean square residual, RMR = 0.021, root mean square error of approximation, RMSEA = 0.064, and comparative fit index, CFI = 0.921. RMR, RMSEA, and CFI values indicate that a good fit was found for the model proposed in the study.

Table 9

Notes for Chi-Square (χ^2) Model

Chi-square model	
Number of distinct sample moments	630
Number of distinct parameters to be estimated	80
Degrees of freedom	550
Chi-square	1602.815*
Probability level	0.000

Note. *Minimum was achieved.

Table 10

Estimation of Model Parameters and Model Fit Measurement Statistics

Fit indices	Model index value	Comments
χ^2 ($p>0.05$)	1602.815 ($p<0.001$)	The required level is not achieved
GFI > 0.90	0.805	The required level is not achieved
RMR <0.08	0.022	The required level is achieved
RMSEA < 0.08	0.068	The required level is achieved
CFI > 0.90	0.909	The required level is achieved

Note. GFI measure is affected by sample size. From "A simulation study to investigate the use of cutoff values for assessing model fit in covariance structure models," by S. Sharma, S. Mukherjee, A. Kumar, and W.R. Dillon, 2005, *Journal of Business Research, 58*(7). Copyright 2004 by Elsevier. doi: 10.1016/j.jbusres.2003.10.007

Table 11 shows the test results on the hypotheses proposed. Among the competencies, only self-efficacy has a significant relationship with MOOCs readiness. As such, the need for further exploration of new factors is further emphasised.

Table 11

Result on Hypothesis

Hypothesis statement of path analysis	Beta estimate	Standard error	Critical region	P-value	Result on hypothesis
Hypothesis 1: There is a relationship between socio-communication competency and MOOCs readiness	0.124	0.152	1.218	0.223	Not supported
Hypothesis 2: There is a relationship between technical competency and MOOCs readiness	.148	0.132	1.515	0.130	Not supported
Hypothesis 3: There is a relationship between self-efficacy and MOOCs readiness	.314	0.084	4.563	***	Supported
Hypothesis 4: There is a relationship between self-directedness and MOOCs readiness	.101	.112	1.183	0.237	Not supported

Note. *** P-value < 0.05.

Discussion

The findings in this study show that self-efficacy has a significant relationship with MOOCs readiness. This suggests that the inclusion of the self-efficacy dimension in the proposed model is highly relevant. The importance of self-efficacy in a MOOC environment was highlighted by Willis et al. (2013). The role of self-efficacy in academic and personal development among adolescents is also well supported by the work by Bandura (1993). The work by Willis et al. (2013) also suggested how self-efficacy among students can be improved by improving their prior learning experiences. This effort is crucial for MOOCs students in Malaysia who display low self-efficacy. Effective use of this strategy requires efforts to create a positive learning experience for students. The incorporation of a self-efficacy component into the design of entrance evaluation systems for online courses and/or MOOCs could help providers identify students who may need additional support. Further research into other possible mechanisms to improve self-efficacy among students enrolled in MOOCs is important.

According to the results of the research at hand, self-directedness or self-regulated learning behaviour does not significantly influence MOOCs readiness. Self-directedness identified as the ultimate aim in lifelong education is an important dimension in this study (Manning, 2007). Self-directedness may be understood as a multifaceted process which integrates several phases including self-motivation, self-control, self-observation, and self-reflection (Zimmerman & Cleary, 2006). Self-directedness can support self-set goals in both academic and personal development areas (Zimmerman & Cleary, 2006). This is rather surprising considering the close relationships between the self-efficacy and self-directedness. Nevertheless, the scope covered under self-efficacy is focused on students' belief in their ability to learn in an online environment

and not their belief in their ability to self-regulate their learning activities. The relationship between the construct and the items under the self-directedness construct should be reviewed again in further studies.

The lack of a strong correlation between socio-communication competency and MOOCs readiness is also surprising. A collaborative learning environment, which is a key feature in many MOOCs, emphasizes the need for this skill to ensure active participation. Connecting with people (social construct) was also identified as one of four main motivations among MOOC students by Milligan and Littlejohn (2017). The need for socio-communication skills is seen as important for successful learning in a MOOC environment where the presence of a community of learners is identified as an important factor (Willis, Spiers, & Gettings, 2013). Perhaps socio-communication competency ought to be analysed as three separate constructs: social, communication, and language competencies. Further exploration of key factors could also consider collaborative learning skills as a possible factor.

Technical competency was also found to be not significant in relation to the level of MOOCs readiness. In this study, respondents' accessibility to digital technology such as PC/Laptop/Tablet/Smartphone (above 95%), accessibility to a stable Internet connection (about 85%), and the ability to connect to files and data with the Internet (at 77.1%) were relatively high. This suggests that respondents were relatively exposed to the Internet and are familiar with digital technology. While technical competency is necessary, students may perceive it as an inherent competency.

Further studies could also focus on redesigning the method of measuring readiness by introducing direct measures and in-depth analyses. Identified demographic factors could be widened to include students' disciplines. The scope of study on MOOCs may also explore research on innovative pedagogies. Many Malaysian MOOCs categorised as xMOOCs use a pedagogical approach resembling traditional courses such as pre-recorded video lectures of the traditional lecture format, and automated exercises and quizzes with opportunities to interact with fellow students and course instructors through discussion boards or chat functions (Porter & Beale, 2015). Such xMOOCs are more content-oriented and use a unidirectional approach (Andone, Mihaescu, Ternauciuc, & Vasiu, 2015). Therefore, there is a need to pay close attention to pedagogy to create an effective learning environment. A learning model based on an open learning environment proposed by Kop, Fournier, and Mak (2011) might be a better model for designing MOOCs. The design of a MOOC needs to consider the challenge of having a diverse and large number of participation s. Thus, understanding students' learning behaviours and the support they need are crucial for successful learning in MOOCs.

Conclusion

This study explores the adaptation of the Student Online Learning Readiness (SOLR) Model to predict MOOCs readiness among Malaysian adult students. The adapted model investigates the use of five competencies in predicting MOOCs readiness, namely: (i) social competency, (ii) communication competency, (iii) technical competency, (iv) self-efficacy, and (v) self-directedness. A total of 413 data sets were analysed in this study using SPSS and SEM. Findings from this study clearly identify self-efficacy as a

determinate of MOOCs readiness. The relatively low mean value for the self-efficacy competency suggests a need for effective measures to increase the level of self-efficacy among Malaysian adult students. The findings also imply the need for further exploration of factors influencing MOOCs readiness. Further studies could enrich existing knowledge on learning behaviours. Further studies regarding MOOCs could also significantly contribute to the field of open and distributed learning.

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