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## Academic papers

# Learning tourism and hospitality subjects with massive open online courses (MOOCs): A cross-sectional and longitudinal study

Liwei Hsu

Graduate Institute of Hospitality Management, National Kaohsiung University of Hospitality and Tourism, 82171, No. 1, Songhe Rd., Hsiao-kang District, Kaohsiung City, Taiwan

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## ABSTRACT

This study investigates the factors that affect learners' engagement in learning about tourism and hospitality subjects using massive open online courses (MOOCs). *Study 1* recruited 361 participants and surveyed their self-determination to learn the subjects through MOOCs. The results of the structural equation model indicated that autonomy and competence significantly affect students' engagement. *Study 2* adopted a longitudinal multilevel model to investigate the engagement of twelve participants during a 10-week MOOC. Their work status was included as a variable because MOOCs have attracted many in-service staff members as learners. The MLM results showed that time was a significant factor, whereas status was not.

## 1. Introduction

Today's students face a wave of globalization that makes their entry into the job market more competitive than ever. Thus, students and even in-service professionals must be able to upgrade their knowledge and develop more skills to increase their competitiveness (Freitas, Morgan, & Gibson, 2015). Many people change their career path, choosing jobs that are not related to their college major (Hsu, 2018), and training programmes designed for working adults are greatly in need. The conventional education models have failed to disseminate the knowledge that students need at a large scale to meet the expectations of industry. The rapid development of Internet technologies in recent years seems to be able to respond to this demand (Ivanova, 2008; Joo & Park, 2015). Further, teachers are also looking for innovative ways to interact meaningfully with their students through emerging technologies (Orsini & Evans, 2015), and online learning creates a new paradigm of teaching (Soares, Lopes, & Vieira, 2015; Kop, 2011). The studies of Jones, Blackey, Fitzgibbon, and Chew (2010) and Shadieff, Hwang, and Huang (2015) emphasize the use of technology in teaching to enhance students' learning effectiveness or performance. Large-scale massive open online courses (MOOCs) developed in response to these conditions, and the focus of instructional design has gradually shifted from being "course-oriented" to "experience-oriented" (Freitas et al., 2015). More empirical research is needed to understand this innovative way of teaching and learning.

MOOCs were hailed by A. Agarwal (cited in Freitas et al., 2015) as the most important educational innovation in the past two hundred years. The biggest difference between MOOCs and previous types of teaching is the accessibility and free-of-charge features of the latter, which can attract more learners (Alraimi, Zo, & Ciganek, 2015; Voss, 2013). Although some scholars such as Romeo (2012) and Jackson (2013) expressed doubts about the use of MOOCs, this innovative teaching tool does have a significant impact on digital education (Bárcena & Martín-Monje, 2014, pp. 1–15; Bates, 2012). However, the convenience of MOOCs may also lead to learners being distracted by other things while learning. On average, the completion rate of each MOOC is only about 10% (Daniel, 2013; Ho

E-mail address: [liweihsu@mail.nkuht.edu.tw](mailto:liweihsu@mail.nkuht.edu.tw).

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et al., 2014; Jordan, 2014; Kolowich, 2013), although it seems unfair to judge the quality of MOOCs only by the completion rate (Hew, 2016). How to decide the quality of MOOCs remains debatable (Xiao, Qiu, & Cheng, 2019). The doubts concerning their effectiveness (Marcus, 2013) and the possible causes of these doubts are the main concerns in implementing MOOCs (Hood, Littlejohn, & Milligan, 2015).

As far as the implementation of MOOCs is concerned, most instructors present the teaching content in a video format and then guide the learning analysis (Soares et al., 2015), which seems to be just digitalizing what they have taught in in-person classes through video-recording. How to encourage learners' participation or enhance their motivation to engage in instructional activities is a major problem that practitioners of MOOCs are eager to solve (Kizilcec, Piech, & Schneider, 2013). Even so, MOOCs provide many advantages, including gathering many learners with different backgrounds through the Internet and overcoming time and space limitations. Moreover, the theory of social learning can be utilized to enhance learners' motivation; after that, students' self-determined learning can make their process of knowledge construction more effective.

In the field of tourism and hospitality education, more and more MOOCs are available to the general public (Hsu, 2018). In this sector, where there is a shortage of workforce, MOOCs can provide further training for in-service personnel. Additionally, MOOCs can also serve as a channel to disseminate knowledge for those who intend to work in this field; therefore, hospitality and tourism subjects delivered through MOOCs have been developing expeditiously in the past years (Xiao et al., 2019). How learners can most effectively learn in the context of MOOCs is a topic worth exploring (Hood et al., 2015; Veletsianos, Collier, & Schneider, 2015), particularly when learners are in-service personnel, who value flexibility and self-determination in learning (Smith, 2019; Tay, 2016). In spite of the importance of this topic, empirical research on the application of MOOCs in hospitality and tourism education remains scarce (Goopio & Cheung, 2020). Additionally, the relationship between motivation and learners' behaviors in MOOCs (De Barba, Kennedy, & Ainley, 2016; Zhou, 2016) calls for further exploration—especially as Xiong et al. (2015) have reported that learners' intrinsic and extrinsic motivation are significantly correlated to their retention rate in MOOCs. A research gap also exists with regard to MOOC learners' self-determination as well as learner type (i.e., full-time students or in-service staff) and their engagements in MOOCs. The findings of this present study can make contributions to the existing body of literature by bridging this research gap and shedding light on how three major elements of self-determination (autonomy, competence, and relatedness) predict learners' engagement in tourism and hospitality MOOCs, using a cross-sectional survey, and how learner status and time factors affect learner engagement, with a longitudinal design (the Longitudinal Multilevel Model). To my best knowledge, this present study is the very first research which employs both cross-sectional and longitudinal designs to examine the underlying influences on learners' engagements in tourism and hospitality MOOCs. This research is designed to answer the following research questions:

RQ 1: What are the structural relationships between hospitality MOOC learners' three psychological needs of self-determination and their engagement in MOOCs?

RQ2: What are the long-term effect of hospitality MOOC learners' work status on their engagement in MOOCs?

In order to address these two research questions, two studies were run. *Study 1* used a structural equation model to answer RQ1, while a longitudinal multilevel model was adopted in *Study 2* to address RQ2. The next section provides a review of the relevant literature. Then, the methods and results of these two studies are presented, followed by the discussion and conclusion sections.

## 2. Literature review

### 2.1. Psychological needs of self-determination theory and motivation

Within the context of MOOCs, students' motivation to learn plays an important role in their successful completion of a course because the presence of the teacher is limited (Wong et al., 2019). The role of "motivation" in students' learning has always been a hot topic in education because motivation influences students' performance, transfer of learned knowledge, and persistence in learning over time (El-Hmoudova, 2014; Stroet, Opdenakker, & Minnaert, 2015). For instructors, understanding students' motivations is useful to help them realize the challenges that both students and instructors will encounter (Abdulhay, 2015). Samson (2015) further explored the relationship between learners' motivation and learning behavior and pointed out that once learners' motivation is enhanced, their engagement in the instructional activities will likewise increase, positively affecting their performance in learning (Paulsen & Feldman, 1999; Perry, Turner & Meyer, 2006; Pintrich, 2003). Social interactions between peers are also an effective way to enhance learners' motivation (Ruzek et al., 2016); So and Brush's (2008) research similarly proposed that cooperative learning can enhance learners' motivation. At the same time, Bates (2015), who was inspired by Bandura (1991), emphasizes that people tend to amplify the value of the results they have invested effort in; when a learner feels that the value of learning is high, it is natural that they will be more motivated to engage in learning. Therefore, it is suggested that curriculum design should motivate learners and increase interaction between peers, learning materials, and teachers (Bates, 2015). With respect to learning using Internet technology, its effectiveness depends greatly on learners' engagement in learning activities (Xie, Debacker, & Ferguson, 2006).

There are several studies on the use of Internet technologies in hospitality education, some of which focus on improving students' engagement in class activities (Kim & Jeong, 2018). For research on motivation in technology-based teaching and learning, the self-determination theory (SDT) proposed by Deci and Ryan (1985) has been widely adopted in the past years (Noour & Hubbard, 2015). The SDT provides a well-established rationale to understand how and why a person acts a certain way (Zhou, 2016) that emphasizes the influence of interactions between learners and learning environment on learners' motivation (Deci & Ryan, 2002). SDT points out that three innate psychological needs help learners consolidate their learning motivation: autonomy, competence, and relatedness (Akbari, Pilot, & Robert-Jan Simons, 2015; Noour & Hubbard, 2015). These three psychological needs are then able to predict learners' learning outcomes (Noels, Pelletier, Clément, & Vallerand, 2000). They are described as follows.

First, autonomy refers to the degree to which learners can make decisions on learning within the learning process (Brophy, 2013). The more autonomous the learning environment is to the learners, the more it is able to shape learners to develop independent judgments and the ability to solve problems. It has been postulated that MOOCs may require learners' autonomy in the learning process (Wong et al., 2019). Second, competence means that learners can achieve expected learning outcomes through interactions in the learning environment (Ntoumanis & Standage, 2009). Furthermore, the factor of competence in SDT emphasizes one's ability to deal with problems encountered in social learning environments during the learning process (Deci & Ryan, 2002). Akbari et al. (2015) further suggested that when learning activities are challenging for learners, their motivation will be enhanced. Third, relatedness is about whether learners have a sense of belonging to a learning environment or learning community (Kennedy, 2007). Nukta, Hauéis, Spitzer, and Hille (2011) reported that when learners maintain meaningful relationships with others in the learning community, a sense of belonging to the learning environment is cultivated. They will feel more comfortable expressing opinions without psychological pressure and, eventually, will have more positive attitudes towards peers.

Although there is extensive research using SDT to explore learners' motivation to use MOOCs (Hsu, Wang, & Levesque-Bristol, 2019; Liu, 2019), our understanding of the relationship between motivation and MOOCs is insufficient as yet (Liu, Zou, Shi, Pan, & Li, 2019). Furthermore, few studies have adopted SDT to understand MOOC learners' motivation to learn tourism and hospitality subjects. *Study 1* in this research was designed to extend our current understanding of the relationship between three independent variables—the three psychological needs of SDT: autonomy, competence, and relatedness—and a dependent variable, course engagement. Research hypotheses are proposed as follows:

- RH1: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their engagement.
- RH2: Learners' level of competence in tourism and hospitality MOOCs is significantly related to their engagement.
- RH3: Learners' level of relatedness in tourism and hospitality MOOCs is significantly related to their engagement.
- RH4: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their level of competence.
- RH5: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their level of relatedness.
- RH6: Learners' level of competence in tourism and hospitality MOOCs is significantly related to their level of relatedness.

## 2.2. Nontraditional learners and their engagement in MOOCs

Given that more and more in-service hospitality staff members are using MOOCs to receive or update their knowledge to meet new professional challenges (Heller, 2014; Ryan, Horton-Tognazzini, & Williams, 2016; Tracey, Murphy, & Horton-Tognazzini, 2016), learners' work status should be considered in related research (Wong, 2017). Four major clusters of learners can be identified in MOOCs, with various goals and motivations (Auditing, Completing, Disengaging, and Sampling) (Nesterko et al., 2013). Getting a certificate of course completion may not be the only objective for learners to enroll in courses (Hew & Cheung, 2014; Wang & Baker, 2015); satisfying their initial curiosity may be another intention, as pointed out by Anderson (2013). For non-traditional learners, particularly working professionals, however, research on their motivation to take MOOCs remains limited (Liu et al., 2019). Understanding learners' engagement in MOOCs is important in part because a meaningful online community can be in operation only when members are actively engaged (de Lima & Zorrilla, 2017). Unlike traditional classrooms, where engagement can be defined as student participation, quite diverse engagement behaviors can be observed in MOOCs: behavioural, cognitive, and social engagement (Deng, Benckendorff, & Gannaway, 2019). Behavioural engagement in MOOCs can be appropriately measured by log data (Milligan, Littlejohn, & Margaryan, 2013) or learners' participation in forums (Baek & Shore, 2016). As individuals' behavior in MOOCs is complex, moderating variables should also be included in study of it, to increase generalizability (Wei & Ram, 2016). Thus, the present study investigated the possible moderating effect of learners' status (full-time students or working professionals) on their engagement in tourism and hospitality MOOCs, which was presented as RH7.

RH7: The status of being a full-time student or a working professional will significantly moderate learners' psychological needs and engagement in MOOCs.

In addition, there is still a need to gain a comprehensive understanding of learners' persistent or long-term engagement in MOOCs (Jung & Lee, 2018). This study would like to address this issue by examining whether learners' status of being a full-time students or working professionals will lead to different levels of engagement in MOOCs longitudinally. The eighth research hypothesis can thereby be proposed:

RH8: In the long run, learners' status of being a full-time student or a working professional will significantly affect their engagement in MOOCs.

## 3. Methods and results

### 3.1. Apparatus

MOOCs were offered by faculty members of the National Kaohsiung University of Hospitality and Tourism (NKUHT), in Taiwan, where the courses are designed, produced, and housed. Their design complies with the standard guidelines for MOOCs (see Spyropoulou, Pierrakeas, & Kameas, 2014, for details). More than 20 MOOCs have been offered at the university since 2015 (please refer to <http://moocs.nkuht.edu.tw/> for details). The total registered users of these MOOCs amount to more than 10,000 people; nevertheless, less than 2000 registered users finished the course. Most of these courses are delivered in Mandarin Chinese, and thus most of the registered users are from Chinese-speaking societies or fluent in this language. Registered users' activities in these MOOCs, including behavioural engagement, were recorded by the system. This study retrieved these data and used the number of lectures to which

students logged in each week as the measure for their engagement in the courses.

### 3.2. Study 1

*Study 1* was designed to explore the structural relationship between SDT variables (autonomy, competence, and relatedness) and participants' engagement in MOOCs. Structural Equation Modeling (SEM) is the main technique to investigate this relationship cross-sectionally.

#### 3.2.1. Participants

Among 2000 registered users of MOOCs who completed the course, we invited 400 participants to join this survey, and 361 valid responses were received (233 females and 128 males, 251 students and 110 in-service personnel in the hospitality and tourism industry). The link to the online survey questionnaire was sent to them via email while they completed the course. Should they not feel comfortable participating in this research or answering the questionnaire, they could simply ignore the invitation, and no penalty regarding their academic record would be imposed.

#### 3.2.2. Measurement

To appropriately measure the participants' self-determination, a questionnaire developed by [Vlachopoulos and Michailidou \(2006\)](#) was adopted by this research. Questionnaire items were translated into Chinese to increase comprehensibility to the participants; the Chinese version was then translated back into English, and the accuracy of the translation was confirmed by three bilingual speakers of English and Chinese. This back-translation approach is commonly practiced in cross-cultural research ([Brislin, 1970](#); [Su & Parham, 2002](#)). Furthermore, given that the original questionnaire was not specifically developed for MOOCs, some revisions were required. The revised version was reviewed by three experts of MOOCs, and they agreed that the content of the questionnaire was adequate. Detailed information on the questionnaire items and their reliability (Cronbach's  $\alpha$ ) and validity (factor loading, composite reliability, and average variance extracted) is reported in [Table 1](#).

According to the information conveyed in [Table 1](#), the 11 items covering the three latent variables had good reliability and validity. Cronbach's alphas were all above 0.80 ([Cho, 2020](#)) and factor loadings of each item were above 0.40 ([Tabachnick, Fidell, & Ullman, 2007](#)). Composite reliability and average variance extracted for each construct surpassed the benchmark for validity (CR > 0.60 and AVE > 0.50) suggested by [Bagozzi and Yi \(1988\)](#) and by [Fornell and Larcker \(1981\)](#). Furthermore, the discriminant validity of this questionnaire was tested and confirmed by the fact that the square root of AVE was greater than inter-construct correlations ([Fornell & Larcker, 1981](#)) (see [Table 2](#) for details). In general, the measures in of *Study 1* were reliable and valid. Learners' engagement refers to the total number of user logins to MOOCs recorded by the platform.

#### 3.2.3. Structural equation model

The structural model examined participants' self-determination and their engagement in MOOCs. AMOS 21.0 was used to test the structural relationship between three latent, independent variables (autonomy, competence, and relatedness) and one observed dependent variable (engagement in MOOCs). Model fit indices ( $\chi^2/df = 3.09$ , GFI = 0.94, AGFI = 0.90, NFI = 0.96, CFI = 0.97, RMSEA = 0.08) indicated that the model fit the collected data well ([Hooper, Coughlan, & Mullen, 2008](#); [Hu & Bentler, 1999](#)). Additionally, evidence of normality of data was examined with kurtosis, skew, and Mardia's coefficient, and the results confirmed that the dataset of this study was normally distributed (kurtosis:  $-0.447$ – $-0.440$ ; skew:  $-0.57$ – $-0.04$ ; Mardia's coefficient =  $81.27 < 143$ ) ([Cain, Zhang, & Yuan, 2017](#)).

#### 3.2.4. Results

The results of SEM indicated that two variables (autonomy and competence) were significant to learners' engagement in MOOCs

**Table 1**  
Questionnaire items and their reliability and validity.

Construct	Item	Mean	Factor Loading	CR	AVE
Autonomy (Cronbach $\alpha$ = .87)	1. The MOOCs programme I use is highly compatible with my choices and interests.	3.97	.60	.87	.62
	2. I feel that the way I use MOOCs for learning fits perfectly the way I prefer to learn.	3.93	.71		
	3. I feel that the way I learn via MOOCs is definitely an expression of myself.	4.02	.89		
	4. I agree that I have the opportunity to make choices with respect to the way I learn via MOOCs.	4.03	.69		
Competence (Cronbach $\alpha$ = .92)	1. I feel I have been making a huge progress with respect to the end result I pursue.	3.78	.76	.92	.74
	2. I feel that I learn very effectively with MOOCs.	3.82	.83		
	3. I feel that learning via MOOCs is a way of learning in which I do very well.	3.78	.97		
	4. I feel that I can manage the requirements of the MOOCs programme I am enrolled in.	3.80	.89		
Relatedness (Cronbach $\alpha$ = .88)	1. I feel comfortable when interacting with other participants of MOOCs.	3.73	.86	.89	.73
	2. I feel that I belong to this class.	3.73	.98		
	3. I feel communicating with the other MOOCs participants is smooth and successful.	3.75	.40		

Note: The item "My relationships with the people I interact with are very friendly" was removed from this study because of its low factor loading (0.15). The reliability of this construct was higher without this item (Cronbach's  $\alpha = 0.88$ ) than with this item (Cronbach's  $\alpha = 0.77$ ).

**Table 2**  
Inter-construct correlations and the square root of AVE.

	Relatedness	Autonomy	Competence
Relatedness	.86		
Autonomy	.62	.79	
Competence	.66	.73	.86

( $\beta_{Autonomy}=0.60, p < .001$  and  $\beta_{Competence}=.24, p < .001$ ). The effect of relatedness was not significant in this study. SEM also showed a significant correlation between the three variables. Furthermore, the  $R^2$  value of learners' engagement was 0.66, indicating that 66% of the data fit the proposed research model (Lestariningsih, Artono, & Afandi, 2020).

This present study also explore the moderating effect of learner's work status on the relationship between three psychological needs and engagement in MOOCs. Results of statistical analysis showed that none of the moderating effects were statistically significant ( $F_{Autonomy*Status}(10, 338) = 1.78, F_{Competence*Status}(10, 336) = 1.13$ , and  $F_{relatedness*Status}(10, 339) = 0.70, p > .05$ ). Table 3 below conveys detailed information.

### 3.3. Study 2

In Study 2, a longitudinal multilevel model (MLM) was adopted to examine the long-term effect of learners' status as full-time students or working professionals members on their engagement in MOOCs. MLM is an appropriate technique to explore "how" and "why" individuals change (Peugh & Heck, 2017), with better statistical precision comparing to repeated-measures ANOVA (Van Der Leeden, 1998). Further, as Hox (2010) pointed out, an advantage of MLM is that it can deal with unstructured and unbalanced data.

#### 3.3.1. Participants

A total of 50 registered users were contacted via email to ask them to join this study. For longitudinal research, a sample size between 8 and 12 may have more than 80% predictive power (Broitman, Kahana, & Healey, 2019). The final sample included 12 participants (3 students and 9 in-service staff members in the tourism and hospitality industry) who were willing to join this longitudinal study at the onset of a new MOOC. They were informed about the nature and procedure of this research, and their written consent was collected. However, participants were not explicitly told that their course engagement would be the focus of data collection to avoid their being possibly biased toward increased participation in MOOC activities knowing that this aspect was to be analyzed. Their engagement in a 10-week MOOC was recorded and retrieved for statistical analyses.

#### 3.3.2. Longitudinal multilevel model (MLM)

In order to effectively analyse longitudinal data with a nested structure, a 2-level hierarchical structure was adopted: engagement over time (level 1) was nested within individuals' work status (level 2) (Ntoumanis, 2014; Steele, 2008). With this model, repeated measurements at level 1 are nested within participants' status at level 2, and the MLM proposed by this research is presented as:

Level-1 Model or within-subject model

$$\text{Engagement}_{it} = \pi_{0i} + \pi_{1i}(\text{TIME}_{it}) + e_{it}, \quad (1)$$

Where  $\pi_{0i}$  is the intercept,  $\pi_{1i}$  is a vector of individual parameters measured along time for each participant, and  $e_{it}$  is the random error term.

Level-2 Model or between-subject model

$$\pi_{0i} = \beta_{00} + \beta_{01}(\text{STATUS}_i) + r_{0i}$$

$$\pi_{1i} = \beta_{10} + \beta_{11}(\text{STATUS}_i) + r_{1i}, \quad (2)$$

where  $\beta_{10}$  is the intercept,  $\beta_{11}$  is the explanatory variable for growth parameter variability, and  $r_{1i}$  is the random error term of the model. Mixed Model for repeated measurement

$$\text{Engagement}_{it} = \beta_{00} + \beta_{01}(\text{STATUS}_i) + \beta_{10}(\text{TIME}_{it}) + \beta_{11}(\text{STATUS}_i)(\text{TIME}_{it}) + r_{0i} + r_{1i}(\text{TIME}_{it}) + e_{it}, \quad (3)$$

The mixed model includes the time-dependent structures in (1) and the explanatory variable in (2). To test the model, the Hierarchical Linear Model (HLM) 6.06 software was used (Raudenbush & Bryk, 2002) to estimate both the fixed and random effects of all

**Table 3**  
Moderating effect of learners' work status on psychological needs and engagement.

	Type III Sum of Square	df	F	Sig.
Autonomy*Status	1943.97	10	1.78	.06
Competence*Status	1378.37	10	1.13	.34
Relatedness*Status	1076.81	10	.70	.73

variables (Muñoz & Chang, 2007). Fixed effects represent how the subjects generally change over time, and random effects are the variance components that are entailed while measuring the relationship of predictors for each participant. The details of the MLM are presented in Table 4.

The longitudinal engagement of participants is showcased in Fig. 2.

Fig. 2 shows the development of participants' engagement in MOOCs over the 10 weeks during which the data were collected. As this figure shows, regardless of their status, the engagement of most participants increased over time.

### 3.3.3. Results

The starting point of MLM is the Level-1 model, which depicts the individual growth trajectory. The null model is the preliminary examination of the appropriateness of using MLM for analyses and the results of Study 2 reported ICC (Intra-Class Correlation) = 0.56, meaning that 56% of the variance in engagement is between individuals and 44% is within individuals. Furthermore, the chi-squared test ( $\chi^2 = 151.84, p < .001$ ) indicated that there was statistical justification for running MLM analyses.

The fixed effect of random intercept model showed that the regression coefficient of the intercept was positive and significant ( $\beta = 15.23, p < .001$ ) and so was the regression coefficient of time on engagement ( $\beta = 0.71, p < .001$ ). The random effect in the random intercepts model reported that the total variance of each participant's engagement in MOOCs was significant ( $r_1 = 0.11, p < .001$ ). Furthermore, the slopes-as-outcomes model were tested with all predictor variables in the model to examine the interactions between predictor variables. The fixed effect of this model indicated that the time factor had a significant effect on participants' engagement in MOOCs ( $\beta = 0.71, p < .001$ ); more precisely, participants' engagement slightly increased over time. There was no significant difference by participants' status as full-time students or working professionals ( $\beta = 2.58, p = .21$ ). The cross-level interaction between participants' status and time was not statistically significant ( $\beta = 0.31, p = .19$ ), which means that participants' status did not affect significantly their engagement in MOOCs, nor was it a significant factor in the long run. The random effect of this model showed that the variance in each participant's engagement at each time the data were collected decreased to 0.10, and this result showcased that the time factor was able to explain 10% of variance in each participant's engagement every time the data were collected.

The results of hypotheses examination are presented in Table 5 below. Among seven proposed research hypotheses, five of them were supported whereas two were not.

## 4. Discussion

As stated by Deale (2015), "Technology continues to influence education and the hospitality and tourism industry throughout all sectors, including lodging, foodservice, meetings, special events, and even education" (p. 155), and MOOCs are one of the technological advancements that do so. Empirical studies on MOOCs are still in their infancy (Ossiannilsson, Altinay, & Altinay, 2016), however, and more evidence is required. This study explored learners' self-determination in learning tourism and hospitality subjects with MOOCs by means of SEM and MLM. Two studies were conducted to address two research questions. The first study used SEM to understand the structural relationship between three factors pointed out by Self-Determination Theory and learners' engagement in MOOCs. It has been suggested that MOOC learners' motivations will affect their engagement in MOOC activities (Shapiro et al., 2017). According to the results of SEM, two out of these three variables (autonomy and competence) significantly influence learners' engagement in learning hospitality and tourism subjects with MOOCs, whereas the third variable, relatedness, is found not to be significant.

Autonomy is the key facilitator of an individual's engagement in learning activities (Benita, Roth, & Deci, 2014; Hew, 2016; Ruzek et al., 2016). Zhou's study (2016) discovered that learners' engagement in MOOCs would not be influenced by external pressure, a finding in line with those of the present study. As Jardin and Gaisch (2014, pp. 73–79) suggested, the concept of MOOCs was developed by people with low-context cultural backgrounds, who are keen to be independent (see Zhou, 2016). MOOCs helped learners with

**Table 4**

MLM: Time and participants' status.

	Unconstrained (Null) Model	Random Intercepts Model	Random Intercepts and Slopes Model
	$\delta^2 = 6.55$	$\delta^2 = .97$	$\delta^2 = .97$
	Intercept, $\pi_0 = 8.38$	Intercept, $\pi_0 = 8.94$ Time, $\pi_1 = -.31$	Intercept, $\pi_0 = 8.35$ Time, $\pi_1 = -.52$
Fixed Effect			
For Intercept 1, $\pi_0$	15.23***	15.23***	15.23***
Intercept 2, $\beta_{00}$			2.58
STATUS, $\beta_{01}$			.71***
For Time Slope, $\pi_1$		.71***	
Intercept 2, $\beta_{10}$			.31
STATUS, $\beta_{11}$			
Variance of random components			
Intercept 1, $r_0$	8.38 ( $\chi^2 = 151.84$ ***)	8.94 ( $\chi^2 = 1021.75$ ***)	8.35 ( $\chi^2 = 868.10$ ***)
Time Slope, $r_1$		.11 ( $\chi^2 = 113.36$ ***)	.10*** ( $\chi^2 = 94.74$ ***)
Level-1, $\epsilon$	6.55	.97	.97
Deviance	593.15	417.84	409.78

\*\*\* $p < .001$ .

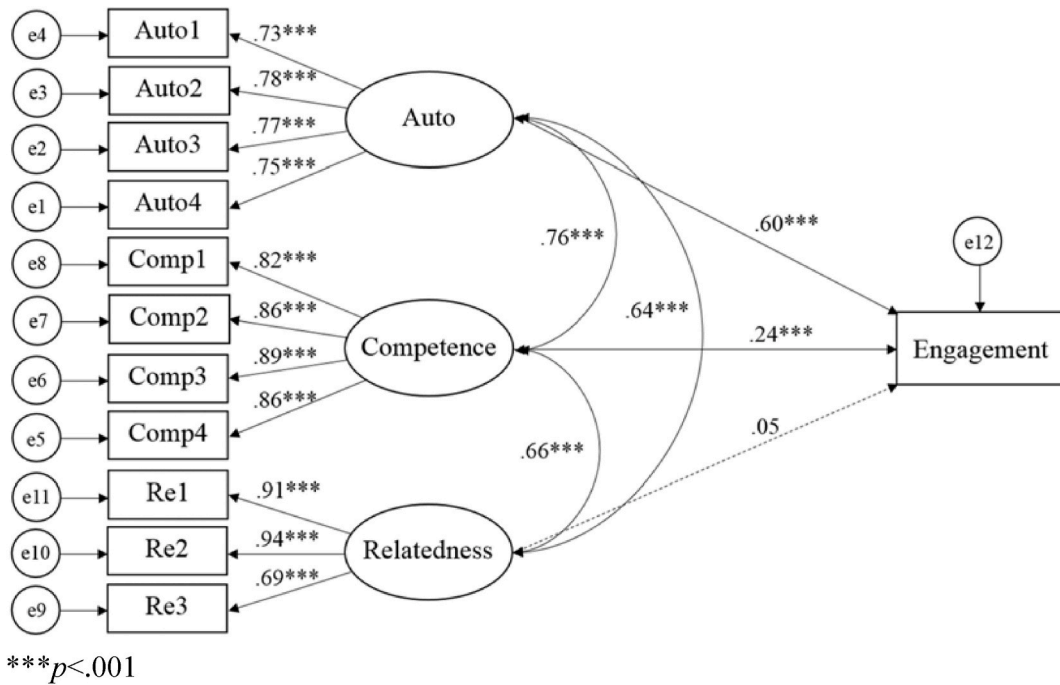


Fig. 1. Structural model of participants' autonomy, competence, relatedness and their engagements in tourism and hospitality MOOCs.

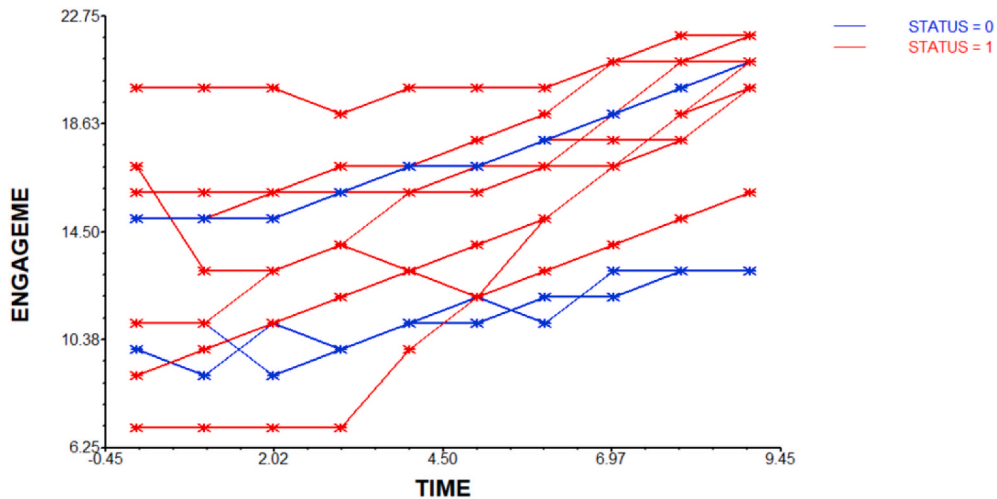


Fig. 2. Longitudinal development of participants' engagements in tourism and hospitality MOOCs over the 10 weeks of time frame.

interdependent self-construal value to make decisions on learning, including when, where, and how to learn. The present learners were generally favourable toward using MOOCs to learn tourism and hospitality subjects, which echoes the findings of Annaraud and Singh's study (2017).

Participants' competence learning with MOOCs refers to their belief that they can successfully play the role they expect to play in the learning process (Ruzek et al., 2016). MOOC learners' competence can be enhanced if they are respected by their peers (Sakiz, Pape, & Hoy, 2012). In this study, learners are aware that their peers may be professionals from the industry, and reciprocal respect can be nurtured among them thereby. Furthermore, it has been suggested that learners' engagement in instructional activities can be enhanced by making the course relevant to them, which can be done by means of the instructor and learners co-creating course materials (Hsu, 2018). The experiences of some participants in the industry can make tremendous contributions to the content of MOOCs (Xiao et al., 2019), and hence the idea of co-creating course materials is feasible in MOOCs. When participants' competence is enriched, their engagement in MOOCs should increase. The results of this study supported this statement.

Relatedness refers to a smooth and friendly relationship between learners and their peers, which would be expected to encourage

**Table 5**  
Results of research hypotheses examination.

Research Hypothesis	Result
RH1: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their engagement.	Supported
RH2: Learners' level of competence in tourism and hospitality MOOCs is significantly related to their engagement.	Supported
RH3: Learners' level of relatedness in tourism and hospitality MOOCs is significantly related to their engagement.	Not Supported
RH4: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their level of competence.	Supported
RH5: Learners' level of autonomy in tourism and hospitality MOOCs is significantly related to their level of relatedness.	Supported
RH6: Learners' level of competence in tourism and hospitality MOOCs is significantly related to their level of relatedness.	Supported
RH7: Learners' status of being a full-time student or a working professional will significantly moderate their psychological needs and engagement in MOOCs.	Not Supported
RH8: In the long run, learner's status of being a full-time student or a working professional will significantly affect their engagement in MOOCs.	Not Supported

engagement (Furrer & Skinner, 2003). In this study, however, the results of SEM did not align with this proposition in the context of MOOCs. One plausible reason is that prior studies on learners' self-determination were conducted in the traditional context, wherein face-to-face interactions do play an important role in learning. In contrast, MOOCs remove the sense of belonging entailed by human connection (Deale, 2015; Shapiro et al., 2017); interactions in the virtual environment coin a new definition of interaction, which might have altered the relationship between relatedness and engagement. Another possible reason is that all participants were from Chinese-speaking societies (i.e., China, Hong Kong, Singapore, and Taiwan), in which gestures and other non-verbal messages are pivotal in communication (Samovar, McDaniel, Porter, & Roy, 2015). Up to this point, MOOCs still fail to solve this problem and thus cannot completely replace traditional education (Ossiannilsson et al., 2016). Future studies are advised to look deeper into this issue.

MOOCs have been acknowledged as a pivotal channel for hospitality and tourism staff who aspire to receive training or professional development without leaving their current jobs (Lin & Cantoni, 2018; Ryan et al., 2016). Therefore, *Study 2* was designed to explore whether participants' status as full-time students or in-service personnel members would significantly affect their engagement in MOOCs from a long-term perspective. The results of MLM indicated that the time factor had a positive, significant effect on participants' engagement. More precisely, the longer an individual learns with MOOCs, the more that individual shows engagement in them. This counterintuitive finding did not reflect what the general public understands about the high dropout rate of MOOCs (Brahimi & Sarirete, 2015). One reasonable explanation is that participants recruited for *Study 2* were those who had completed the course; therefore, they were highly motivated learners and their motivation and engagement in MOOCs would have increased over time.

As regards participants' work status, MLM did not find any significant difference in engagement the first time the data were collected or over time. This is an important finding of this study, as it explicitly points out that participants' work status is not a significant factor in either short- or long-term analyses. A potential reason may be that only 3 out of the 12 long-term participants were students, while 9 were in-service staff members in the hospitality industry. This unbalanced sampling might have caused biased results. Another explanation might be that the participants were all strongly motivated, so that regardless of their status, their engagement in MOOCs was not significantly different. Future studies are necessary to recruit more full-time students and investigate their long-term motivation to engage in learning activities with MOOCs.

## 5. Conclusions

MOOCs are an emerging, influential educational platform. Despite their importance in changing the landscape of education, empirical evidence concerning the results of their implementation is still limited. This study aimed at filling this gap and extending our current understanding of the effect of learners' self-determination on their MOOC experience, with implications for the use of MOOCs in tourism and hospitality education. Two studies have been designed and conducted; *Study 1* used SEM to explore the structural relationship between three variables extracted from SDT (autonomy, competence, and relatedness); 361 participants joined this survey, which was measured using the tool developed by Vlachopoulos and Michailidou (2006). The results of SEM show that autonomy and competence are significant factors in explaining participants' engagement in MOOCs, while relatedness is not significant.

In terms of the long-term effects of time and participants' work status on their engagement, *Study 2* adopted MLM to examine a 2-level hierarchical structure: engagement over time (Level 1) nested within individuals' status (Level 2). The results of the unconstrained (null) model indicate that 56% of variance in engagement is between individuals and 44% is within them. The time factor is found to be significant for participants' engagement in MOOCs, whereas participants' status is not.

The main limitations of this study are two. First, both studies use a quantitative method, which should be combined with qualitative information and analysis to help us understand the underlying reasons why relatedness and participants' status are not significant factors predicting their engagement. Another limitation is that the background of the participants is not sufficiently diverse, which might influence the robustness of the findings across contexts. Despite these limitations, this study may offer some implications to designers and practitioners who employ MOOCs as part of their pedagogy or practice. Given the importance of participants' autonomy, as reported in this study, the first suggestion is that designers of MOOCs should give participants more room to make decisions on the learning process. Competence is also a significant variable, and so instructors and learners should collaborate on course materials, taking advantage of the learners' competencies. On the other hand, learners' sense of belonging to the MOOC does not seem to be critical. Since participants' engagement increases over time while their work status is not a significant factor for their engagement,



designers and practitioners of MOOCs should focus on quality of course materials and pay less attention to learners' backgrounds.

### Author Statement

Liwei Hsu: Conceptualization, Data curation, Methodology, Software, Validation, Writing- Original draft preparation and revision.

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### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jhlste.2020.100276>.

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