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TOWARDS A NEW MEASUREMENT OF MASSIVE OPEN ONLINE COURSES

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ABSTRACT

The concept of Massive Online Open Courses (MOOCs) has drawn a lot of attention since 2008. Some people asserted that it would become the salvation of people currently unable to access education from all over the world, while others believed that MOOCs are all hype. One problem MOOCs face is related to numerous researchers adopting completion rate as a standard measurement to gauge learner and course performance. In a traditional setting, a completion rate is used as an indicator of higher institution success. However, MOOCs are different from traditional higher institutions thus may merit a different metric. This study intends to explore MOOCs with a different "returning learners" approach, by drawing insights from the research on repeat customers in the marketing field. Specifically speaking, this research intends to look at learners' interactions with MOOCs through the lens of returning learners, and to explore the attitudes of the returning learners and how culture has impacted returning learners. The primary objective of this research is to investigate how often learners come back to a MOOC, and attitudes (motives of taking the course and intention of completion the course) they form toward the MOOC, through a survey. The second objective is to explore potential differences in how and why learners return to the MOOC based on diverse cultural attributes. The study adopts a quantitative method to analyze survey and clickstream data to develop a deeper understanding of learners' attitudes and behaviors. Results suggest that completion rate should not be the only measurement for assessing MOOCs, and quantifying the activities of returning learners can be a novel way to gain insights about MOOC learners.

Key words: MOOCs, Measurements, Returning learners, Online Learning, and Hofestede Dimensions

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Chapter 1- Introduction

Massive Online Open Courses (MOOCs) have become a battlefield since Stephen Downes, George Siemens, and David Cormier created the concept in 2008. Some people asserted that it would become the salvation of people all over the world (Pappano, 2012) by providing access to education, while others believed that the clamor about MOOCs is primarily hype (Fischer et al., 2013). In separate reports, both Ho et al., (2014)) and Perna et al., (2014) indicated that roughly 50% of participants stopped doing activities on week 1 while participating in Harvard University and Massachusetts Institute of Technology (MIT) MOOCs, and in the University of Pennsylvania (Penn) MOOCs. In addition, Ruby, Perna, Boruch, & Wang, (2015) indicated low standardized access rates (defined as a ratio of the number of opportunities a course offers) on 12 Penn MOOCs courses in their first generation.

Koller et al., (2013), however, indicated that researchers should consider learners' intentions when enrolling a MOOC before calculating the completion rate, and proposed that there were still benefits for learners who did not finish the MOOC, such as "zero financial cost to themselves or tax payers (p63)." In addition, Fischer, (2014) pointed out that despite a 4% completion rate in MOOCs, there might still be thousands of learners who completed the course, which is still more than a professor can teach in a residential university. From his perspective, "the biggest contribution of MOOCs is that they have generated a broad and (so far) lasting discourse about learning, teaching, and education in which not only narrow, specialized academic circles participate, but also the media, universities administrations, politicians, and many others." (p156)

Background

Definition of MOOCs

MOOCs first emerged in 2008. George Siemens, Stephen Downes, and Dave Cormier facilitated the Connectivism MOOC (cMOOC) called Connectivism and Connective Knowledge (Also known as CCK08). All the course material was open through RSS feeds, blog posts, discussions forums, and virtual meetings. Over 2,000 people registered for it over the duration of the course. Since then, Extended MOOC (xMOOC) platforms also have emerged, such as Coursera, EdX, and Alison. In 2012, New York Times even named the year "the year of the MOOC".

So, what are MOOCs? According to Mcauley, Stewart, Siemens, & Cormier, (2010):

"A MOOC integrates the connectivity of social networking, the facilitation of an acknowledged expert in a field of study, and a collection of freely accessible online resources. Perhaps most importantly, however, a MOOC builds on the active engagement of several to thousands of 'students' who self-organise their participation according to learning goals, prior knowledge and skills, and common interests. Although it may share in some of the conversations of an ordinary course, such as a pre-defined time and weekly topics for consideration, a MOOC generally carries no fees, and no prerequisites other than Internet access and interest" (p. 5).

In general, MOOCs are "understood to be full-length 'courses' that can accommodate large number of users from across the globe ('massive'), are available at no charge to users with minimal registration requirements ('open'), and are delivered 'online', over the Internet" (Perna et al., 2014a, p. 421).

Categories of MOOCs

There are currently two major types of MOOCs: cMOOCs and xMOOCs. The first cMOOC, "Connectivism and Connective Knowledge (CCK08)," offered for academic credit at the University of Manitoba and facilitated by George Simmons and Stephen Downes (Siemens, 2013) attracted more than 2,000 students, and was translated into six different languages. The course was designed on a foundation of connectivist theory where learning is networked, open, and decentralized. Every day learners received emails about links and articles to read and participated in discussions at their own virtual learning spaces, and got involved in virtual events (Downes, 2012). This course was regarded as the beginning of the cMOOC. According to Siemens, cMOOCs are defined as:

> "The integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements–not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing" (Siemens, 2013, p. 4).

The general public is much more familiar with "xMOOCs," which stands for extended MOOCs, which means "MOOC as extension of something else (Downes, 2013)". Originally, "x" stands for "programs that aren't part of the core offering, but which are in some way extensions (Downes, 2013)." In 2011, Sebastian Thrun and Peter Norvig offered a free online course "Introduction to Artificial Intelligence", and more than 160,000 people from all over the world

enrolled (Hill, 2012). Very similar to a class setting with lecture, homework, and assessment, xMOOCs utilize education technology to teach at scale (Hill, 2012). Later, platforms such as EdX and Coursera become popular, and 2012 was even named, by New York Times, as "the year of the MOOC".

Course Activities in MOOCs

Although MOOCs have been evolving, a typical MOOC course consists of video lecture, assignments, assessments, and discussion forums (Perna et al., 2014). Over the course of the years, in MOOC platforms such as FutureLearn, assessments have changed from open to every registrant to now only available to the registrants who pay for the opportunity to earn certificates. The non-certificate learner can still have access to the video lecture as well as discussion forum. Some MOOCs, for example, the MOOC "Modern and Contemporary American Poetry" offered by the University of Pennsylvania, also contains community Teaching Assistant sessions and live Google hangout sessions with the instructor throughout the course. Informal local meet-ups are also sometimes organized by learners who are enrolled in the course.

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Statement of the Problem

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One problem MOOCs experience is a bad reputation, which is related to dismal looking statistics about learner success and satisfaction. The basis of these statistics is the adoption of completion rate as a standard measurement to gauge learners' performance and satisfaction. By definition, completion rate is "the percentage of students who began the course and finished with a grade of C or better" (The National Center for Academic Transformation, 2013). As a traditional measurement, completion rate is used to assess whether a learner successfully completes a course (Thomas, 2002). Typically, a learner enrolls in the course, makes progress, and completes (Perna et al., 2014a). Completion of a course is one of the indicators used to measure the success of higher

education institutions (Ho et al., 2014). In educational systems, there are two separate goals: learning and credentialing, and only the latter concern needs to be based on completion (Stewart, 2013).

In a traditional college setting, everything is designed with one purpose: course completion. (Smith, 2011) indicated how everything in college is set up for students to complete the course: guidance preparation for students to enroll in the right classes, tutoring services, supplemental teaching sessions, office hours, other instructional support, curriculum design, and the entire grading system.

Unfortunately for people interested in learning for its own sake, course completion has become a currency that can be cashed in for social opportunities (Stewart, 2013). The entire institutional system is set up based on "public acceptance of ceremonial legitimation of individualized learning into currency of credentials (Stewart, 2013)". The credentials are the ultimate hope for social stratification (Neelsen, 1975).

However, MOOCs do not have all the institutional supplementary supports mentioned above. In a typical xMOOC setting, there is video lecture, quiz, assignment, discussion forum, and optional teaching assistant(s). People enroll in the course without having an advisor to provide assistance. Learners may or may not have completed prerequisite courses, and the curriculum is designed in the standard way that doesn't favor anyone. Instructors do not have office hours for students, and they do not grade the quizzes nor assignments. The goal for MOOCs is more learning oriented, aiming to provide people from all over the world access to education. Driven by that mentality, initial MOOCs did not emphasize course certificates. In summary, the supporting infrastructure for a MOOC is completely different than that for a typical college course. From that

perspective, comparing MOOC course completion to a traditional college completion is like comparing apples and oranges.

In addition, offering learning opportunities at a mass scale with a great potential does not make MOOCs an education system (cited by Stewart, 2013), and MOOCs cannot fulfill the hope to end social stratification. Currently, non-certified MOOC learners do not have access to assessments, so a "completion" of the course simply means that learner has engaged most of the video lectures. For a certificated MOOC learner, even finishing all the assessments and eventually earning the certificate does not guarantee that the certificate holder will have better social or employment opportunities. Current employers generally do not recognize MOOC certificates regardless of which institutions have issued them, for multiple reasons (Banks & Meinert, 2016). In a way, the core concept of MOOCs is to promote learning (so that learners can learn just in time, and just in place), not to prevent social stratification.

Devlin (2013) contends that comparing MOOCs with traditional colleges through completion rate is misleading as it is "applying the traditional metrics of higher education to MOOCs" whereas MOOCs are something very different which call for different metrics. Devlin indicated that comparing MOOCs to traditional higher education in the 21st century is similar to recognizing the first automobile as a "horseless carriage" in the early twentieth century.

In addition, course completion rate is not the optimal indicator to measure whether a course is successful from the perspectives of a learner's academic performance or learners' attitudes. From a learner's perspective, there are other indicators that better define success in a college setting, such as the level of engagement in the learning and critical thinking cultivated from learning (Jennings et. al, 2013). In a college setting, sometimes students complete required courses just to fulfill the degree requirements. In some cases, more than two hundred students sit in a classroom

taking one course together just to meet the requirement. In a longitudinal study conducted by Tessema, Ready, & Yu (2012), authors found that factors like quality of instruction, capstone experience, academic advising, overall college experience and career preparation have positive impacts on a college learner's satisfaction level. Feldman (1976) also found that college students' grades have nothing to do with the students' evaluation of the course or instructor. High grades do not equal to high learner satisfaction or high course quality.

Completion rate cannot measure learners' satisfaction in MOOCs either. Palmer & Devers (2018) adopted Net Promoter Scores as an indicator to measure students' overall satisfaction with the course. Authors surveyed learners who signed up for a MOOC offered by a public university in the East Coast of the U.S with 18 general questions (such as gender, ethnicity, satisfaction level) and a Net Promoter score question ("would you recommend this course to a friend or a colleague"), using a five-point Likert Scale. 764 out of 4,000 registered learners participated the study. They found that learners in general were satisfied with the course. In addition, more than half of the participants reported they were extremely like to recommend the course to a friend or a colleague, while less than 8% of the learners would **not** recommend the course.

In addition, Hadi & Gagen (2016) proposed a new methodology to assess the value of MOOCs that focuses on measuring "micro learning." Researchers designed a unit-based digital badge within the two MOOCs from the University of Derby in 2015. They utilized the new model to measure the percentage of units completed as well as the percentage of learners achieving meaningful learning. Through the two metrics, these researchers found that both MOOCs had significantly higher overall completion rates when compared with the standard completion rate. From their perspective, they successfully recorded the "meaningful learning" (Bali, 2014) and "substantial learning" (Ho et al., 2014).

Furthermore, course completion rate is inappropriate to measure learners who are culturally diverse. Although MOOCs are open to learners from all over the world who have access to the Internet, studies have suggested that the curriculum design, delivery style, and assessment approaches of MOOCs favor of learners from western societies (Altbach, 2014, Lau, 2014). Little is known about whether the international learners who completed or failed to complete the course are actually satisfied with the course. For example, Chen et al. (2005) conducted a study to explore the factors that motivated learners and found out that Chinese culture plays a significant role in terms of course completion. However, there was little information in the study addressed course satisfaction. A learners' completion of a course does not indicate satisfaction with that course. There should be different measurements to assess learners with diverse backgrounds in terms of their satisfaction with MOOCs.

Purpose of the Study

The overreaching purpose of this study is to explore MOOCs employing a different approach to course evaluation, taking a "returning learners" perspective drawing insights from "repeat customers" thinking in the marketing field. Specifically speaking, this research intends to look at learners' interactions through the lens of returning learners, and to explore the attitudes of the returning learners, and how culture may be impacting the return of learners. The primary objective of this research is to investigate how many different days learners return to their MOOCs, and what their attitudes are with the MOOCs, as indicated through a survey given before the course begins. This understanding will help us better determine the extent to which MOOCs are successful *from a learner's perspective*. The second objective is to explore whether learners return to their MOOCs differently, based on cultural attributes. The study will adopt Hofstede's "six cultural

dimensions" as a theoretical framework to determine how cultural attributes may impact learners' decisions to return.

Research Questions

The overall question this study intends to answer is: Do MOOC learners appear to perceive the MOOCs in which they enroll as valuable, as indicated by a comparison of the percent of the course they intended to complete and the percent of the course they actually completed, and by the number of times they returned to the course, while interpreting these data based on their reasons for taking the course?

To answer the main question, this study is guided by following sub-questions:

1. Are the number of active days different for completers and returning learners?

2. Are one-time visitors, returning learners, and completers different with regard to whether or not they had previously taken online courses?

3. Is the distribution of one-time visitors, returning learners, and completers different in STEM and non-STEM courses?

4. Do one-time visitors, returning learners, and completers differ with respect to reasons for taking the course?

5. Do one-time visitors, returning learners, and completers intend to and actually complete similar percentages of the course? And what are the differences?

6. What are the relationships between three groups of learners, number of MOOCs previously completed, motives for taking the courses, intention to complete and actual completion?

7. Are there relationships between the three groups of learners and cultural attributes?

Significance of the Study

This research challenges the use of conventional course completion rates as the predominant measurement of MOOC quality and impact. Previous research (Palmer & Devers, 2018) has suggested that completion rate is far-fetched when comes to evaluating MOOCs. By introducing learner return rate, this study plans to provide an alternative measurement to assess learners' behavior and attitudes, and to determine learners' attitudes and behavior towards MOOCs.

In addition, this research will employ a cultural lens to gain a better understanding of how cultural attributes may impact learners' interactions within MOOCs. Current studies (Liu et al., 2016) have indicated that cultural factors have influenced MOOC enrollment, engagement, and completion; however, this study will provide insights on how culture may influence whether learners will return to their MOOCs or not, and may determine which cultural backgrounds may be associated with learners tending to come back to the course more frequently.

This study will also broaden current existing literature on the evaluation of MOOCs. Specifically speaking, empirical studies on MOOCs currently have a dominant voice in terms of measuring MOOCs, and do so primarily through completion rates. This study will help future researchers to assess the value of MOOCs using a different approach.

Definitions of Key Terms

The following is a list of the key terminologies and their definitions in the context of this study.

Brand Loyalty: Oliver (1999, 2014) defined brand loyalty as "a deeply held commitment to rebuy or repatronise a preferred product/service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts having the potential to cause switching behavior." In general, there are five factors

associated with customer loyalty: perceived value, customer satisfaction, brand trust, repetitive purchase behavior, and commitment.

Culture: The term "Culture" is defined differently in different disciplines. This study will see culture in a cross-cultural setting. Specifically speaking, this study will adopt the Scheel & Branch (1993) definition of culture, where it is defined as "the pattern of behavior and thinking by which members of groups recognized and interacted with one another. These patterns are shaped by a group's values, norms, traditions, beliefs, and artifacts (p.7)."

CMOOCs: Simmons defined Connectivist MOOCs as cMOOCs and defined them as: "The integration of principles explored by chaos, network, and complexity and self-organization theories. Learning is a process that occurs within nebulous environments of shifting core elements–not entirely under the control of the individual. Learning (defined as actionable knowledge) can reside outside of ourselves (within an organization or a database), is focused on connecting specialized information sets, and the connections that enable us to learn more are more important than our current state of knowing." (Siemens, 2013, p. 4)

Hofstede National Cultural Dimensions: Geert Hofstede originally developed this framework for IBM to conduct cross cultural analyses for employees of IBM in multiple countries, but now the framework has been adopted widely for cross cultural analysis in psychology, business, communication and academic research. It began with four dimensions but has expanded to six dimensions. individualism-collectivism; uncertainty avoidance; power distance; masculinity-femininity; long-term orientation; and indulgence versus self-restraint.

MOOCs: Massive Open Online Courses are defined as full-length courses being offered online for free and with minimal enrollment processes to accommodate a large number of learners

from all over the world (Perna et al., 2014b). This study will be limited to xMOOCs (see definition below).

Repeat Customers: Repeat customers are considered as "the customers who have purchased from the vendor at least once (Hee Woong Kim & Gupta, 2009, p. 477)". Customers returning to a vendor is directly associated with customer loyalty.

Repeat Customer Rate: repeat customers rate is "the proportion of customers that have shopped more than once. (Jenkins, 2016)" This is a metric used to understand the ratio of repeat customers in comparison to the customer base. Currently, there is no strict cut off number to indicate a good or bad repeat customer rate, but on average the repeat customer rate falls between 20% and 40% (Mceachern, 2018).

Returning Learners: adopting the concept of Repeat Customers, this study defines the concept of returning learners as the learners who have come back to the course more than once on different days. As with repeat customers, we anticipate that the following factors will be associated with returning learners: perceived value, learner satisfaction, trust, returning learning behavior, and commitment. Due to data constraints, this study only analyzed three factors: motives for taking the course (a proxy for perceived value), repetitive learning behavior, and the percentage of the course each learner intended to complete (a proxy for commitment).

XMOOCs: extended MOOCs, which means "MOOC as extension of something else (Downes, 2013)". In general, xMOOCs include video modules, quizzes, peer-assessments, and discussion forums.

Summary

This chapter introduced the background of MOOCs, presented the need for the study, the purpose of the study, the research questions, and the significance of the study. The next chapter

summarizes the theoretical frameworks this study will adopt, and current studies related to these frameworks. Specifically, the conceptual frameworks discussed will be repeat customers, factors that constitute repeat customers, returning learners, culture, and Hofstede's national cultural dimensions. The next chapter will also review recent studies focused on repeat customers and cultural attributes in MOOCs.

Chapter 2- Conceptual Framework and Literature Review

This chapter highlights the theoretical framework underlying this research and current empirical studies related to the subject, beginning with an explanation of the concept of repeat customers, the factors attributed to the concept, and how the study will adopt the concept of repeat customers into MOOCs. In addition, this chapter will explore culture and Hosfstede's National Cultural Dimensions. After presenting established theoretical frameworks, the chapter will explore empirical studies on repeat customers, other measurements that have been adopted to appraise MOOCs, culture and MOOCs, and the application of Hofstede's National Cultural Dimensions to MOOCs.

Theoretical Framework

Repeat Customers

This study will use "returning learners" as one theoretical framework. The concept of returning learners comes from the concept of repeat customers in the marketing field. Repeat customers are "those who have purchased from the vendor at least once (Hee Woong Kim & Gupta, 2009, p. 477)" and repeat customer rate is defined as "the proportion of customers that have shopped more than once (Jenkins, 2016)". According to Alba & Hutchinson (1987), a repeat customer has a better understanding of the meaning of transaction information because he or she has had previous experiences with the vendor and has developed a personal system of beliefs, transactions, etc.

Repeat customers are crucial for a business, especially for an online vendor to succeed. Uzumian (2013) discovered that 25% to 40% of the total revenue of the most stable business in an online shopping network, SumAll network, comes from returning customers. In addition, he found that a repeat customer tends to spend often and makes the business more robust. In addition, repeat

customers perceive more value of the product/service before purchasing; are more certain about the online transactions (Hee Woong Kim & Gupta, 2009); are more satisfied with the experience (Dodd, 1999; Pantouvakis & Lymperopoulos, 2008); have greater trust in vendors (Gefen, Karahanna, & Straub, 2003); and are more affectively committed to the vendor (Mattila, 2004).

The concept of repeat customers is directly related to brand loyalty. Oliver (1999, 2014) defined brand loyalty as

> "A deeply held commitment to rebuy or repatronise a preferred product/ service consistently in the future, thereby causing repetitive same-brand or same brand-set purchasing, despite situational influences and marketing efforts are having the potential to cause switching behavior."

It is considered as a mixture between attitude and behavior (Jacoby & Kyner, 1973). Key indicators for brand loyalty as well as repeat customers are customer perceived value, brand trust, customer satisfaction, repeat purchase behavior, and commitment (Gefen et al., 2003; Hee Woong Kim & Gupta, 2009; Mattila, 2004; Pantouvakis & Lymperopoulos, 2008; Punniyamoorthy & Prasanna Mohan Raj, 2007). Punniyamoorthy & Prasanna Mohan Raj (2007) indicated that commitment and repeated purchase behavior are crucial along with perceived value, satisfaction, and brand trust.

Based on previous studies, this study has identified the concept of repeat customers through behavioral and attitudinal dimensions. In the behavioral dimension, the concept includes repeat purchasing behavior as a factor; and in the attitudinal dimension, it consists of four factors: perceived value, customer satisfaction, brand trust and commitment. (See Figure 1.)

Figure 1.

Repeat Customers Model
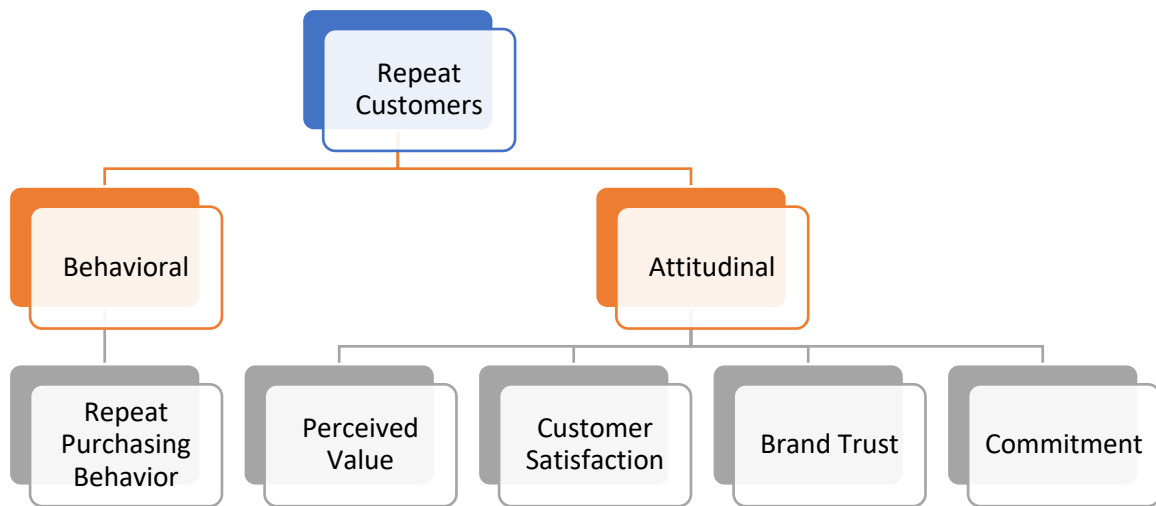
Perceived value

      Parasuraman & Grewal (2000) indicate that perceived value is crucial in terms of predicting a repeat customer. It consists of "get" and "give" components where the customers "get" the value that the product/services offers and "give" whatever the product/service costs (Dodds, Monroe, & Grewal, 1991). In a way, perceived value can be seen as "a broad construct focusing on prices, costs incurred, and benefits delivered by a marketer versus competitors (Pitta, Franzak, & Fowler, 2006, p. 423)." GIS Commerce (2009) also pointed out that "more than ever before, consumers are searching online for products, services, and websites that provide value" In addition, according to a survey conducted by Endeca Technologies & Allurent (2009), 93% of online customers are looking for things that are fresh, innovative and challenging to meet their intrinsic motivation.

Multiple studies have explored relationships between perceived value and online shopping behavior (Hee Woong Kim & Gupta, 2009; Pitta et al., 2006; C.-C. Wang & Yang, 2008). Studies (Delafrooz, Paim, Haron, Sidin, & Khatibi, 2009; Zeithaml, Berry, & Parasuraman, 2014) have suggested that customer behavior is goal oriented. There are two dominant types of studies analyzing online shopping goals: one is value-oriented (Jones, Reynolds, & Arnold, 2006; Wang, 2008); and another is benefit-oriented (Atchariyachanvanich, Okada, & Sonehara, 2008; Forsythe, Liu, Shannon, & Gardner, 2006). According to means-end theory (Gutman, 1997), benefit-orientated shopping motive is a subset of value-orientated shopping motive (Chiu, Wang, Fang, & Huang, 2014).

Brand trust

In marketing, trust is defined as "a psychological state comprising intention to accept vulnerability based on ones' positive expectations of the intentions or behaviors of another (Singh & Sirdeshmukh, 2000)." Trust helps customers reduce perceived risk that customers might suffer a loss; and boosts customer's belief that they will have positive experiences (Pitta et al., 2006). The concept of risk and trust in terms of the process of how two parties exchange socially has been modified over recent decades by a variety of scholars (Blau, 1964; G. R. Jones & George, 1998; Molm, Takahashi, & Peterson, 2000; Singh & Sirdeshmukh, 2000). According to Kim, Xu, & Koh (2004), trust building on the Internet between customers and online shopping sites is more difficult than in-person trust building, the reason being that all the information a customer receives is second-hand information and with such information alone it is difficult to build a stabilized trust, until a customer has gained more experience with the online shopping site and can be more confident. In a way, brand trust on the Internet is built through customers' experiences with the shopping site. Garbarino & Johnson (1999) explored the relationship between brand loyalty and

brand trust. They emphasized the importance of trust in terms of building long-term positive relationships.

Customer satisfaction

Customer satisfaction represents the emotional reaction to a transaction experience (Spreng, MacKenzie, & Olshavsky, 1996). Having a positive experience can lead to positive perceptions about the vendor and strong belief that vendors will behave in an expected way (Jones & George, 1998; Singh & Sirdeshmukh, 2000). Studies (Anderson & Sullivan, 1993; Chen, Johnson, Tsai, Deborah, & Johnson, 2006; M. A. Jones, Mothersbaugh, & Beatty, 2000) have demonstrated that a satisfied customer is more likely to continue the relationship with the vendor than a dissatisfied one. Curtis, Abratt, Rhoades, & Dion (2011) conducted a meta-analysis to explore the relationship among brand loyalty, repurchase intent, and customer satisfaction. They discovered that repurchase intent and customer satisfaction have a strong positive relationship, and loyalty and customer satisfaction also have a strong positive relationship. Studies (Mayer, Davis, & Schoorman, 1995; Mcknight, Cummings, & Chervany, 1998) have claimed that satisfaction reflects vendors' abilities to meet customers' needs. In a way, customer satisfaction can also lead to brand trust. Although some studies (Mittal & Kamakura, 2001; Taylor, Hunter, & Longfellow, 2006) have questioned the direct relationship between customer satisfaction and actual repetitive purchase behavior, Curtis, Abratt, Rhoades, & Dion (2011) have proven the constant positive relationship between the two factors through their meta-analysis.

Repeat purchase behavior

Repeat purchase behavior is believed to form the base of brand loyalty (Punniyamoorthy & Prasanna Mohan Raj, 2007). It is referred as "the extent to which consumers re-purchase the same brand in any equal-length period of time (Ehrenberg, 1988, p. 3)" According to

Punniyamoorthy & Mohan Raj (2007), behavioral brand loyalty is the reoccurrence of customers' purchase behavior, and customers would develop a frequency of habits. (Foroudi, Jin, Gupta, Melewar, & Foroudi, 2016) believe that all of the attitudinal factors have direct impacts on repeat purchase behavior.

Commitment

Commitment is believed to be central in terms of establishing a relationship between seller organization and customers, and it is a key psychological force (Bansal, Irving, & Taylor, 2004). In addition, Morgan & Hunt (1994) believe commitment brings "efficiency, productivity, and effectiveness (p. 22)". Studies of online shopping environments (Donio', Massari, & Passiante, 2006; Huang, 2008; Ponnavolu, 2001; Ribbink, Riel, Liljander, & Streukens, 2004) have shown that commitment and maintenance of customers' commitment are important factors in determining customers' loyalty. Over time, if a customer has perceived the product/service valuable, has had positive experience throughout the transaction, has repetitive actions, and has developed brand trust, commitment might follow (Pitta et al., 2006). True loyalty is determined by commitment, which is assessed through behavior and other attitudinal factors as a whole. Without commitment, a repeat customer's loyalty might be gone when there is a change in a vendor's supply condition, and the repeat customer will be more likely to develop loyalty with another vendor (Pitta et al., 2006).

Applying Repeat Customer Literature to MOOCs

Applying the concept of repeat customers to MOOCs might provide some insight in terms of evaluating MOOCs. This study explores patterns of returning learners in MOOCs, drawing from efforts to measure repeat customers in marketing. Specifically speaking, this study intends to adopt a repeat customers model to MOOCs, taking learners' attitudes and behaviors into consideration.

There are several similarities between a returning learner and a repeat customer. A returning learner perceives the value that the course delivers; trusts the quality of course that the instructor delivers; is satisfied with the course knowledge; is committed in learning the new knowledge; and repetitively logs into a course and interacts within the course. In the meantime, a repeat customer perceives the value of the product/service; trusts the transaction experience that the vendor delivers; is satisfied with the shopping experiences; is committed to the vendor; and repetitively visits or logs into the shopping site and generates transactions.

Use of a returning learner model based on the repeat customer literature in marketing might be useful because of similarities between MOOC platforms and online shopping sites, such as Amazon. For instance, learners/customers can have access to both MOOCs and online shopping sites freely, and at any time and at any place, and for as long as they would like, as long as there is Internet. The learner/customer takes control of the interaction within the shopping site/MOOC platform. A learner can share thoughts and comments at discussion forums while a customer can leave comments and share thoughts about the product in customer reviews. In a way, both platforms are allowing participants to create content. In addition, the technology has made fulfilling transactions easy in both learning and shopping. Accessing a video module in MOOCs is equivalent to purchasing something online: each learner uses time as a currency to pay for the service and receives knowledge as a non-material product; while a customer uses money as a currency to pay for the goods and receive the product.

In addition, an online shopping site can be considered as a "community of practice (Davenport & Hall, 2001)" where customers share insights and create content regardless of age, gender, ethnicity, nationality, location, and area of expertise. For instance, a customer can leave a comment on the site commenting on how to use the product/service in a better way, or simply pose

a question on how to use it in a specific setting. Another customer who sees the content can apply the approach, pose a new question, answer the question, or simply leave a comment. Meanwhile, MOOC platforms serve a similar role, offering a space for people who have similar interests to share ideas without any constraints. Learners who register for the course can post questions on discussion forums, sharing ideas, making comments and creating new content.

In sum, the concept of returning learners consists of two dimensions: attitudinal and behavioral. The attitudinal dimension consists of perceived value, learner satisfaction, trust, and commitment; the behavioral dimension includes repetitive learning behavior. (See Figure 2.)

Figure 2.

Returning Learners Model
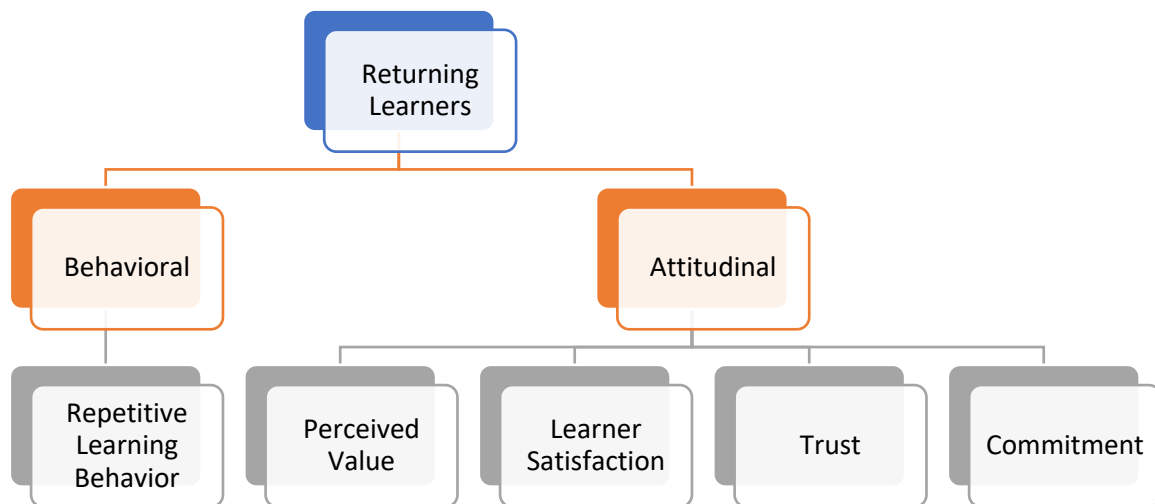
Culture and MOOCs

Culture is difficult to define considering its broad application in a variety of disciplines. There are multiple definitions of culture in the literature. For example, Hofstede (2011) defined

culture as "the collective programming of the mind that distinguishes the members of one group or category of people from others (p.3)." Honold (2000) indicated "culture defines members of a group as distinct from members of other groups. Culture creates an orientation system and a field of action for these members (p. 228)." In addition, Scheel & Branch (1993) pointed out that culture is defined as

> "the pattern of behavior and thinking by which members of groups recognize and interact with one another. These patterns are shaped by a group's values, norms, traditions, beliefs, and artifacts. Culture is the manifestation of a group's adaptation to its environment, which includes other cultural groups and as such, is continually changing. Culture is interpreted very broadly here so as to encompass the patterns shaped by ethnicity, religion, socio-economic status, geography, profession, ideology, gender, and lifestyle. Individuals are members of more than one culture, and they embody a subset rather than the totality of cultures identifiable characteristics (p.7)."

When people from diverse cultural backgrounds participate in online courses, they will have different perceptions of the course, different ways of thinking, different approaches to participation, and even different emotions (Shattuck, 2005). In order to be aware of cultural differences, a person has to have cross-cultural sensitivity. Cross-cultural sensitivity refers to a person being aware of different ways of looking at a problem based on diverse culture (Powell, 1997). Several studies have investigated cultural issues in online education. For instance, Liu, Liu, Lee, & Magjuka (2010) investigated perceptions of international students in an online MBA program. They found that factors, such as language and communication tool use, have direct impacts on international learners' performances. In addition, Hannon & D'Netto (2007) discovered

that cultural differences also have impacts on learners' satisfaction level when they encounter organizational and technological problems.

As MOOC participants come from all over the world, culture has also played a crucial role in learners who have participated in MOOCs. According to Vygotsky's social development theory (Vygotsky, 1978), learning is a social process that facilitates learning. Learners who grow up with different cultural backgrounds would have different social processes. Based on each learner's prior social experiences, the way each learner interacts with MOOCs would be different based on culture. From this perspective, cultural differences among learners would lead to a very different social process.

Hofstede National Cultural Dimensions

To better understand cross-cultural issues in MOOCs, one has to measure differences among different cultures (Feng et al., 2013). This study will adopt Hofstede's national cultural dimensions as a theoretical framework for this purpose. Hofstede's cultural dimension theory, developed by Geert Hofstede, is a cross-cultural analysis framework based on factor analysis. Hofstede originally developed the framework to enable IBM to conduct cross cultural analysis to inform and better understand employees of IBM in multiple countries, but now the framework has been adopted widely for cross cultural analysis in psychology, business, communication, and academic research. There are six dimensions within this framework: individualism-collectivism; uncertainty avoidance; power distance; masculinity-feminity; long-term orientation; and indulgence versus self-restraint.

Power Distance

Power distance is defined as "the extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed

unequally (Hofstede, 2011, p. 9)." It indicates that the concept of inequality is recognized and defined from the bottom to the top; not the other way around (Hofstede, 2011). Table 1 presents the differences between countries with low power distance and high-power distance. There are currently seventy-six countries for which the Power Distance Index has been developed; East European, Latin American, Asian and African countries are on the high end and Germanic and English-speaking countries are on the low end (de Mooij & Hofstede, 2010).

Table 1.

Difference between low power distance and high-power distance

Low Power Distance	High Power Distance
Use of power should be legitimate and is subject to criteria of good and evil	Power is a basic fact of society antedating good or evil: its legitimacy is irrelevant
Parents treat children as equals	Parents teach children obedience
Older people are neither respected nor feared	Older people are both respected and feared
Student-centered education	Teacher-centered education
Hierarchy means inequality of roles, established for convenience	Hierarchy means existential inequality
Subordinates expected to be consulted	Subordinates expected to be told what to do
Pluralist governments based on majority vote and changed peacefully	Autocratic governments based on co-optation and changed by revolution
Corruption rare; scandals end political careers	Corruption frequent; scandals are covered up
Income distribution in society rather even	Income distribution in society very uneven
Religions stressing equality of believers	Religions with a hierarchy of priests

Source: Hofstede (2011 p. 9)

Uncertainty Avoidance

Uncertainty avoidance "indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. Unstructured situations are novel, unknown, surprising, and different from usual (Hofstede, 2011, p. 10)". High uncertainty countries tend to restrict unstructured situations by reinforcing regulations, codes of conduct, rules and laws. They only believe in the absolute truth and they are the ones who have it (Hofstede, 2011). Table 2 shows the differences between low uncertainty countries and high uncertainty countries. Currently there are 76 countries listed on Uncertainty Avoidance Index; East and Central European countries, Latin American countries, Japan and Germanic speaking countries tend to be higher and English and Nordic speaking countries and Chinese cultural related countries tend to be lower.

Table 2.

Differences between Low Uncertainty Countries and High Uncertainty Countries

Low Uncertainty Avoidance	High Uncertainty Avoidance
The uncertainty inherent in life is accepted and each day is taken as it comes	The uncertainty inherent in life is felt as a continuous threat that must be fought
Ease, lower stress, self-control, low anxiety	Higher stress, emotionality, anxiety, neuroticism
Higher scores on subjective health and well-being	Lower scores on subjective health and well-being
Tolerance of deviant persons and ideas: what is different is curious	Intolerance of deviant persons and ideas: what is different is dangerous
Comfortable with ambiguity and chaos	Need for clarity and structure
Teachers may say "I don't know"	Teachers supposed to have all the answers
Changing jobs on problem	Staying in jobs even if disliked
Dislike of rules – written or unwritten	Emotional need for rules – even if not obeyed
In politics, citizens feel and are seen as competent towards authorities	In politics, citizens feel and are seen as incompetent towards authorities
In religion, philosophy and science: relativism and empiricism	In religion, philosophy and science: belief in ultimate truths and granted theories

Source: Hofstede (2011 p. 10)

Individualism versus Collectivism

Individualism versus Collectivism is "the degree to which people in a society are integrated into groups (Hofstede, 2011, p. 11)". In an individualistic society, everyone is expected to take care of himself/herself and the immediate family members; while in a collectivistic society, everyone is expected to look after groups and extended family members. Currently, there are 76 countries listed for this index, western countries and developed countries tend to lean towards

individualism; Eastern countries tend to be more collectivist, and Japan is neural in this index.

Table 3 demonstrates the differences between individualism and collectivism.

Table 3.

Differences between Individualist Countries and Collectivist Countries

Individualism	**Collectivism**
Everyone is supposed to take care of him- or herself and his or her immediate family only	People are born into extended families or clans which protect them in exchange of loyalty
"I" - consciousness	"We" – consciousness
Right of privacy	Stress on belonging
Speaking of one's mind is healthy	Harmony should always be maintained
Others classified as individuals	Other classified as in-group or out-group
Personal opinion expected: one person one vote	Opinions and votes predetermined by in-group
Transgression of norms leads to guilt feelings	Transgression of norms leads to shame feelings
Languages in which the word "I" is indispensable	Languages in which the word "I" is avoided
Purpose of education is learning how to learn	Purpose of education is learning how to do
Task prevails over relationship	Relationship prevails over task

Source: Hofstede (2011 p. 11)

Masculinity versus Femininity

Masculinity versus Femininity "as a societal, nor as an individual characteristic, refers to the distribution of values between the genders which is another fundamental issue of any society, to which a range of solutions can be found (Hofstede, 2011, p. 12)". Hofstede (2011) mentions

that in the IBM study conducted in 1998, he has discovered that "women's values differ less among societies than men's value; men's values from one country to another contain a dimension from very assertive and competitive and maximally different from women's values on the one side, to modest and caring and similar to women's values on the other (Hofstede, 2011, p. 12)". Currently there are 76 countries listed in the index. Masculinity dominated countries are Japan, German speaking countries, and some Latin countries. Mild Masculinity countries are English speaking western countries; and low masculinity countries are Nordic countries, Netherlands, some Latin countries and some Asian countries. Table 4 presents the differences between Feminine and Masculine countries.

Table 4.

Differences between Feminine Countries and Masculine Countries

Femininity	Masculinity
Minimum emotional and social role differentiation between genders	Maximum emotional and social role differentiation between the genders
Men and women should be modest and caring	Men should be and women may be assertive and ambitious
Balance between family and work	Work prevails over family
Sympathy for the weak	Admiration for the strong
Both fathers and mothers deal with facts and feelings	Father deal with facts, mothers with feelings
Both boys and girls may cry but neither should fight	Girls cry, boys don't; boys should fight, girls shouldn't fight
Mothers decide on numbers of children	Fathers decide on family size
Many women in elected political positions	Few women in elected political positions
Religion focuses on fellow human beings	Religion focuses on God or gods
Matter-of-fact attitudes about sexuality; sex is a way of relating	Moralistic attitudes about sexuality; sex is a way of performing

Source: Hofstede (2011 p. 12)

Long-term Orientation versus Short-term Orientation

Valued by cultures with long-term orientation were "perseverance, thrift, ordering relationships by status, and having a sense of shame; valued at the opposite, short term pole were reciprocating social obligations, respect for tradition, protecting one's 'face', and personal steadiness and stability (Hofstede, 2011, p. 13)". Confucius has already brought up the long-term orientation in his teaching in 500 B.C, and the mentality still dominates most of Asian countries (Hofstede, 2011). This dimension was added in 1988 to capture the differences of countries under

the influence of Confucius. Due to the limitation, there are only 23 countries listed in this index. Table 5 shows the differences between long-term orientation and short-term orientation countries.

Table 5.

Differences between Short-term oriented Countries and Long-term oriented Countries

Short-Term Orientation	Long-Term Orientation
Most important events in life occurred in the past or take place now	Most important events in life will occur in the future
Personal steadiness and stability: a good person is always the same	A good person adapts to the circumstances
There are universal guidelines about what is good and evil	What is good and evil depends upon the circumstances
Traditions are sacrosanct	Traditions are adaptable to changed circumstances
Family life guided by imperatives	Family life guided by shared tasks
Supposed to be proud of one's country	Trying to learn from other countries
Service to others is an important goal	Thrift and perseverance are important goals
Social spending and consumption	Large savings quote, funds available for investment
Students attribute success and failure to luck	Students attribute success to effort and failure to lack of effort
Slow or no economic growth of poor countries	Fast economic growth of countries up till a level of prosperity

Source: Hofstede (2011 p. 15)

Indulgence versus Restraint

Indulgence refers to "a society that allows relatively free gratification of basic and natural human desires related to enjoying life and having fun. Restraint stands for a society that controls gratification of needs and regulates it by means of strict social norms (Hofstede, 2011, p. 14)". Based on the World Values Survey, this new index was added in 2010. Drawing empirical studies on "happiness research." this dimension indicates that indulgent societies allow for free

gratification and people to enjoy life, while in restraint-oriented societies there are very restricted rules on gratification (Hofstede, 2011). Currently, there are 93 countries listed in this index. Indulgent countries are mostly in South and North America, Western Europe, and in parts of Sub-Sahara Africa; Restraint countries are in Eastern Europe, Asian, and the Muslim world; and Mediterranean Europe is neutral in this index. Table 6 indicates the differences between Indulgent countries and Restrained countries.

Table 6.

Differences between Indulgent Countries and Restrained Countries

Indulgence	Restrained
Higher percentage of people declaring themselves very happy	Fewer very happy people
A perception of personal life control	A perception of helplessness: what happens to me is not my own doing
Freedom of speech seen as important	Freedom of speech is not a primary concern
Higher importance of leisure	Lower importance of leisure
More likely to remember positive emotions	Less likely to remember positive emotions
In countries with educated populations, higher birthrates	In countries with educated populations, lower birthrates
Most people actively involved in sports	Fewer people actively involved in sports
In countries with enough food, higher percentage of obese people	In countries with enough food, fewer obese people
In wealthy countries, lenient sexual norms	In wealthy countries, stricter sexual norms
Maintaining order in the nation not given a high priority	Higher number of police officers per 100,000 population

Source: Hofstede (2011, p. 16)

Literature Review

Repeat Customers

Klassen & Glynn (1992) surveyed customers about a national mail order company that has around 500,000 orders annually to determine the differences between repeat customers and non-repeat customers. A random number table was generated for researchers to determine participants. 557 out of 800 people responded to the survey. Two hundred and forty-three and 314 participants were non-repeat customers and repeat customers, respectively. In terms of the survey, researchers adopted a seven-point semantic differential scale to 16 questions related to three attitudinal categories. Based on the discriminant analysis, they found out that variables designed to measure customers' attitudes, such as service, price, and value were statically significantly different in terms of discriminating between repeat customers and non-repeat customers: repeat customers tended to value the services more and perceived the value higher than non-repeat customers.

Kim & Gupta (2009) compared potential customers and repeat customers in terms of their purchase decision in an online shopping setting. The authors picked a Korean online bookstore which averaged 12,000 visits to the website on a daily basis. They developed and distributed the survey to people who visited the online bookstore and had more than a thousand responses. Through the data analysis, they found that repeat customers perceive greater certainty in transactions with the bookstore website whereas potential customers perceive greater risk and uncertainty before transaction. In addition, they found that repeat customers are susceptible to key information with regard to transactions and overall perception of value in decision-making.

Kim, Xu, & Koh (2004) explored online trust building factors between potential customers and repeat customers. Using a questionnaire about an online bookstore that had more than 120,000 daily visits spanning two weeks of data collection, the authors collected less than two thousand

responses. Through data analyses, authors have discovered that there is a difference between potential customers and repeat customers in terms of trust building: repeat customers fail to rely on reputation but care for service level more. In addition, the authors also found that customer satisfaction has a strong impact on trust building for repeat customers.

Dodd (1999) conducted a study to explore how to attract repeat customers to wineries in Texas. By approaching people in each winery to complete the survey, the author collected more than 600 complete questionnaires. Dodd then separated the group into two: first-time customers and repeat customers, and found that repeat customers spent more on wine and wine accessories. Although there were no demographic differences (age, gender, education, and income) between first customers and repeat-customers, repeat customers were more determined to visit the winery, perceived more value of the wine, and had more positive attitudes towards the winery.

Culture and MOOCs

Nkuyubwatsi (2014) explored how MOOCs are designed to be relevant to students in their own cultural settings across five Coursera courses. Using a cultural translation observation protocol, the author collected data from lecture videos, quizzes, assignments, course projects and discussion forums. The author adopted a cross-case analysis approach to analyze the data. He found that in two of the five courses, giving students the freedom to choose diverse cultural setting for their project activities enabled cultural translation. In addition, all the courses encouraged learners to work collaboratively and in informal learning settings. Nkuyuwatsi also recommended that instructional designers should be aware of cultural translation setting when designing a MOOC.

Alabdullaziz (2015) studied cultural diversity in a MOOC, redesigning it based on principles of activity theory and examining potential influences of several cultural attributes on communication, self-efficacy, technology, and Anglo-American context to determine whether

those factors would predict students' completion rates. The data sample consisted of 133 learners from 52 countries who were also enrolled in a midwest American university. Through running a logistic regression, she concluded that cultural factors other than those selected ones need to be explored.

Ahn, Yoon, & Cha (2015) examined MOOCs from a cultural perspective to facilitate learners from all over the world but especially from Korea, by providing user-friendly services and content. Researchers first identified 16 criteria related to cultural sensitivity, and then developed an evaluation process employing 5-point Likert-scales. Through conducting case studies on 10 courses from EdX and Coursera with 10 participants, they discovered that: 1) Korean learners tend to seek out instructors' information and opinions, however, most MOOCs from western countries cannot satisfy this relationship building process; 2) the way that discussion forums present information in MOOCs is very different from materials with which Korean learners normally interact; 3) with no information on ending date, Korean learners are confused with the deadlines; 3) with minimum information on learners in the MOOC, Korean learners find it difficult to build a relationship with other learners; 4) Korean learners tend to avoid challenging another learner on discussion forums as part of the cultural influences, which contradicts the intention of MOOC discussion forums; and 5) MOOC interface design elements are very different from those with which Korean learners usually interact.

Teixeira, Teixeira, Aberta, & Stracke (2012) developed the Global MOOC Quality survey to assess learners' satisfaction and perception of the quality in MOOC design and implementation. After doing literature reviews and other analyses, the authors developed the survey and conducted a pre-survey before release to a larger population. The team surveyed 267 participants across learners, instructional designers, and course facilitators. Based on the survey results, they found

four interaction clusters across MOOCs: learner-facilitator, leaner-resource, learner-learner, and group-group. They found out that learners rated a higher perception of quality and satisfaction in comparison to designers. In addition, through in-depth follow-up interviews, they discovered that designers seem to recognize different expectations across MOOC learners, but tended not to execute ways to fulfill learners' diverse expectations.

Quinn & Robinson (2015) mapped learners' engagement patterns in a MOOC offered by Penn State. Authors connected learners' course activities with their location (IP addresses from the MOOC). Course activities included course enrollment, course completion, engagement with the course discussion forum, gender distribution, and drop out pattern after the first exam in the course. They discovered a participation difference between rural and urban areas across countries. In addition, they discovered a high enrollment pattern in the United States, and high drop out rates in English speaking countries and Spanish speaking countries.

Hofstede National Cultural Dimensions in MOOCs

Liu et al. (2016) explored how cultural and geographic factors have impacted learner performance through Hofstede National Cultural dimensions. Specifically speaking, they situated their analyses through three dimensions of learners' behaviors: course activity; quiz activity, and discussion forums. Based on course activity, they have identified five categories of learners: viewers, solvers, all-rounders, samplers, and bystanders. Throughout their studies, they discovered that there are more solvers in developing countries across all course activities; cultural clusters are aligned with student types; and learners tend to go to discussion forums straight after interacting with the course materials. They also clustered the groups with Hofstede cultural dimensions. They found that countries with higher power distance and lower individualism dominated, across the courses. They were also less likely to interact with discussion forums than learners from countries

with lower power distance and higher individualism. Lastly, they found that learners tend to interact within their own culture, especially learners from China and Brazil.

Arslan, Bagchi, & Ryu (2015) investigated the correlations between learners' citizenship and the possibility of receiving a certificate in MOOCs. Factors that they put into considerations are learner's demographic factors, Internet bandwidth, and three of the Hofstede's cultural dimensions (uncertainty avoidance index, individualism versus collectivism, and masculinity versus femininity) with learners from developing countries and developed countries. They found that certification completion varies between learners from developing countries and developed countries. Learners from countries with a higher level of uncertainty avoidance were more likely to earn a MOOC certificate and it seems likely that people from countries with different levels of these dimensions embrace distinct cultural beliefs, and that learners' cultural beliefs influence their learning activities in MOOCs. In addition, they found out that while culture did not appear to be a major factor in terms of certificate completion in developed countries, GDP per capita and percentage of households with a computer did play a crucial role.

Buholzer, Rietsche, & Söllner (2018) conducted a study related to cultural differences and MOOC peer assessment. By acknowledging that cultural differences can potentially create conflicts during peer assessment, the authors adopted a design science approach to create a culturally sensitive process in MOOC peer assessment. They utilized Hofstede's national cultural dimensions as different elements when creating the peer assessment process and evaluated the design elements by comparing Swiss learners and Chinese learners in a qualitative study. They found that learners do have preferences for design elements based on where they come from. For example, Chinese learners prefer to receive detailed information about their reviewers whereas Swiss learners prefer anonymity.

Stager (2015) investigated the relationship between culture and MOOC learners' participation patterns (view of a course video, submission of a course assignment, and submission of a peer-reviewed assignment) through an art MOOC. The author adopted Hofstede's National Cultural Dimensions as the theoretical framework to analyze a MOOC offered by the Pennsylvania State University. Results revealed statistically significant differences among the participation patterns in four cultural dimensions: Individualism vs Collectivism, Uncertainty Avoidance Index, Long-Term Orientation vs Short-Term Orientation, and Indulgence vs Restraint. The only one dimension that did not exhibited statistically significant differences between dependent variables and the independent variables were Long-Term orientation vs Short-Term Orientation.

Bayeck & Choi (2018) explored MOOC videos through Hofstede's National Cultural Dimensions, investigating MOOC introductory videos through a case study approach. The three countries they compared were France, United States, and Korea. Authors coded the video lectures and analyzed the transcripts through content analysis approach. They discovered that the videos are highly affected by the national culture of the University by which the MOOCs were developed.

Summary

This chapter first introduced conceptual frameworks on repeat customers: its concept and factors related to it; how learners return rate evolved from it; culture and Hofstede's National Cultural Dimensions by stating the definitions, background and key attributes. In addition, this chapter reviewed empirical studies on repeat customers, other alternative measurements to assess MOOCs, culture and MOOCs, and Hofstede's Cultural Dimensions and MOOCs. Next chapter will introduce this study's methodology and data analysis approach.

Chapter 3- Research Design and Methodology

Approved by Penn State Institutional Research Board (IRB), this study examined the extent to which MOOCs are successful through the lens of returning learners, and how cultural factors might play a role in learners' perceptions about MOOCs and the probability of learners returning to MOOCs. In order to achieve those goals, this study adopted a quantitative research method with course pre-survey and clickstream data mining to understand learners' attitudes and behaviors. This chapter describes detailed methodological perspectives on the research context, research design, datasets, data preparation, variables, and the approaches adopted for data analysis.

Research Context

Introduction to selected MOOC courses

This study started by analyzing ten MOOCs from Harvard University. All ten MOOCs came from HarvardX in the edX platform. All courses were in the xMOOC format, with standard course videos, quizes, peer-reviewed assignments, final exam and discussion forums.

Unlike traditional online courses and early MOOCs that had a starting date and an ending date, HarvardX offers MOOCs in a self-paced learning style. Employing a self-paced mode allows learners to register for a course at any time and finish a course at any time without the constraints of starting and ending dates. In this self-paced learning setting, a learner can have access to nearly everything, however, for some courses a learner may choose to pay for a certificate in order to get access to the assignments and to have the assignments graded. This type of MOOC better serves life-long learners who do not have a solid starting date and ending date, which may also better serve the returning learner population where they determine the value of the course through their own terms.

In order to cover diverse audiences, this study selected courses in two categories: Science, Technology, Engineering, and Math (STEM) courses and Non-STEM courses. According to the Department of Education website (2018), accounting, economics, and business-related courses are considered to be non-STEM courses. Among the ten MOOCs, five of them were STEM courses, and other five were non-STEM courses.

EdX also had implemented "specialization certificate programs," through which a learner could complete a set of courses and receive specialized certificates or diplomas, after paying fees and successfully completing assignments. The four courses on the specialization track are identified by an asterisk in Table 7 below. Three of the four courses with the asterisk on the below were STEM courses on the specialization track and one was non-STEM courses, which might influence return and completion rates.

Table 7.

List of selected MOOCs

Course	Discipline	Course Length
Introduction to Family Engagement in Education	Non-STEM	6 weeks
Entrepreneurship in Emerging Economies*	Non-STEM	6 weeks
Data Science: R Basics*	STEM	8 weeks
MalariaX: Defeating Malaria from the Genes to the Globe	STEM	8 weeks
Calculus Applied*	STEM	10 weeks
The Architectural Imagination	Non-STEM	10 weeks
Masterpieces of World Literature	Non-STEM	12 weeks
Principles of Biochemistry*	STEM	15 weeks
The Ancient Greek Hero	Non-STEM	18 weeks
The Quantum World	STEM	26 weeks

From Table 7 we can also see that the estimated time to complete these courses range from 6 weeks to 26 weeks. Two courses are estimated to be 6 weeks long; two courses are 8 weeks long; two courses are 10 weeks long; one course is 12 weeks long; one course is 15 weeks long; one course is 18 weeks long; and one course was 26 weeks long. Overall, STEM courses averaged 13.4 weeks long, and the non-STEM courses averaged 10.4 weeks long. Each week is considered as a module. In each module, there are several videos lectures and a quiz, and/or assignments. Because the design of these courses took their content and purposes into account during instructional design, the course activities vary in frequency, format and discipline.

Table 8 provides detail on the selected courses. In total, STEM courses had 556 videos and non-STEM courses had 753 videos.

Table 8.

Course Information

Course	Earliest	Latest	# of users done survey	# of registrants	Percent of survey completion	Number videos
Calculus Applied	5/24/17	4/29/19	8363	13571	61.6%	60
The Quantum World	5/27/16	4/29/19	8791	13609	64.6%	284
Introduction to Family Engagement in Education	11/1/17	4/29/19	6009	10270	58.5%	74
The Ancient Greek Hero	11/23/16	4/29/19	3870	7297	53.0%	384
Masterpieces of World Literature	11/30/16	4/29/19	10969	14811	74.1%	145
Principles of Biochemistry	8/1/16	4/29/19	11682	15580	75.0%	130
Data Science: R Basics	7/19/17	4/29/19	44522	71739	62.1%	24
MalariaX: Defeating Malaria from the Genes to the Globe	1/24/17	4/29/19	2462	3501	70.3%	58

Entrepreneurship in Emerging Economies	11/18/16	4/29/19	23465	34120	68.8%	68
The Architectural Imagination	01/01/16	4/29/19	121767	154608	78.8%	64

Datasets

The study relied on two types of anonymized data sources: clickstream data and survey data. Clickstream data from the 10 MOOCs was collected by HarvardX to monitor learners' learning patterns. All the data is stored in databases on HarvardX servers. Pre-survey questions for this study were embedded in the first module of each MOOC. Consistent with the IRB approval, this statistical analysis aggregated the data to maintain anonymity of participants. Neither the analysis nor the research findings will expose the identification of specific subjects.

Survey dataset

The course survey, designed and administered by HarvardX, included basic demographic information, education level, levels of commitment to complete activities, motives, and a few topics not relevant to this study. This study specifically analyzed two types of information: basic demographic information and attitude-related survey information.

Basic demographic information. This section includes information on age, gender, ethnicity, nationality, course goals, and prior experiences with online courses. The rationale for collecting basic information is to have a better understanding of how different types of learners learn during and benefit from the courses.

Previous records of online course completion. The survey asked following question to determine the number of online courses learners had completed in the past.

- How many online courses have you completed in the past? Please indicate from 0-12, where "12" means 12 and more

Attitudinal information. Responses from the following two survey questions were analyzed:

- How likely are you to complete this course? Please indicate the probability that you will have completed enough work to earn a certificate by the end of the course. A "100" means that you certainly will finish the course, while a "0" means that you certainly will not finish the course

- Why did you enroll in this course?

    o General interest in topic (yes or no)

    o Relevant to job (yes or no)

    o Relevant to school or degree program (yes or no)

    o Relevant to academic research (yes or no)

    o For personal growth and enrichment (yes or no)

    o For career change (yes or no)

    o For fun and challenge (yes or no)

    o Meet new people (yes or no)

    o Experience an online course (yes or no)

    o Earn a certificate (yes or no)

    o Course offered by prestigious university/professor (yes or no)

    o Take with colleagues/ friends (yes or no)

    o To improve my English skills (yes or no)

The two attitudinal survey questions served as proxies for the two attitudinal factors: perceived value and commitment to completion. The previous chapter made the case for motives and intentions as proxies for perceived value and commitment. No data related to the concept of

trust and learner satisfaction were collected. However, as one of the top 10 universities in the world, Harvard University has established its reputation as a trustworthy source for learners to pursue an institutional degree. Unfortunately, the pre-survey data could not ask for learners to indicate their levels of satisfaction prior to entering the course.

Clickstream data

This study analyzed learners' clickstream data to have a better understanding of learners' behaviors and patterns of progression throughout the course. Clickstream data in general contains data about learners' interactions within the course, such as how many times a learner has watched a course video and how many times a learner attempted a quiz. By analyzing clickstream data, this study established a better understanding of one of the factors believed to be associated with Returning Learners, repetitive learner behavior. In addition, integrating learning analytics was also a logical way for the researcher to explore the relationship between a returning learner's attitudes and behavior.

Data Preparation

In total, there were 339,106 learners signed up for the 10 courses. All the raw data in was exported in .csv format. There were 453 files across the 10 courses covering the years 2016 to 2019. However, for unknown reasons, these large data files did not properly open when "clicked on." When the researcher attempted to upload them into SPSS, the data structure changed, requiring reformatting through SAS and SPSS to ensure the data points in each variable were consistent with the variables and their structures.

All survey data were imported and merged with clickstream data records in SAS and SPSS. In total, 241,900 learners interacted with the pre-survey.

In addition, this study needed to determine learners' country to incorporate the Hofstede cultural dimensions. The IP addresses of the device through which each learner participated in the course were automatically recorded in the clickstream data the moment each learner started taking the course and were converted into a country name and recorded in the dataset. Because of globalization, some people have spent significant amounts of time immersed in several different cultures across the globe, and a person might be acculturated based on how long he/she has stayed in one or more countries (Cheung, Chudek, & Heine, 2011) regardless of where the person was born. Therefore, although some error might be introduced by this method, the best available and most often used method in research is to determine the culture most likely associated with each learner by identifying the country where the learner was located when taking the course. To incorporate the Hofstede National Cultural Dimension index data, the researcher imported the index rankings for each nation into the dataset by matching each participant's country name. Currently Hofstede National Cultural Dimensions have index data for 141 countries as of the year of 2020; however, the learners in the 10 courses came from 234 countries in total. The learners from the countries where the cultural dimension index is not available were eliminated for the data analysis on the last research question. In addition, the researcher updated the Hofstede index to match with the most recent index score. For instance, some countries had the number of 999 in some dimensions as indicators that no value had been assigned at that time. Through ongoing research, experts in the field have added, modified, and updated index numbers for some nations. The study also combined all the countries that are categorized as Africa East and Africa West for data analysis as the cultural dimensions only have index numbers for Africa East and Africa West.

Limitations of Available Data

Due to the incomplete nature of MOOC data (Perna et al., 2014) and based on personal past experiences with similar data, processes have been employed to overcome manageable data difficulties. To overcome restrictions on access to the MOOC data the researcher originally proposed to analyze data from both Coursera and EdX MOOCs platforms, and to analyze data from the University of Pennsylvania and Harvard University. Although data requests were submitted to both Harvard and Penn in July of 2018, Penn later informed the researcher that their MOOCs (offered through both Coursera and PennX) are prohibited from including surveys, and therefore they could only provide the "clickstream data." Clickstream data, without the survey data, would still allow tracking of learners' actions as they moved through the courses, but would not have allowed examination of key research questions. Harvard EdX responded in November of 2018, agreeing to share the clickstream data and pre-course survey data (they did not conduct post-surveys at that time). Because this level of data allowed investigation of the study's key research questions the researcher signed the contract with Harvard EdX on Dec 31st, 2018. However, the data was not deposited into a secured digital at Harvard allowing the researcher access until May of 2019. Overall, the data access process took 10 months. In addition, while the data received were sufficient for some of the study's proposed research questions, the data available required redefinition of some variables.

Variables

Dependent Variable

Groups of Learners Variable

This study grouped the learners into three groups: one-time visitors, the ones who only showed up for one day and never came back afterwards; returning learners, the ones who

returned to the course one or more times; and completers, the ones who completed the course.

From Table 9. we can see that more than half of the learners fall into the category of returning

learners, and one-time visitors encompass just under 38.8% of all learners. Completers, in most

of the courses, comprised two to three percent of course participants, with two exceptions being

the R basic course that featured a completion rate of 14.5 percent, and the Malaria course with

10.9 percent of the learners completing.

Table 9.

Distribution of Three Groups of Learners by Course

Course	One-time Visitor N (%)	Returning Learner N (%)	Completers N (%)	Total N (%)
Calculus	3,285 (42%)	4,394 (56.4%)	128 (1.6%)	7,807 (100%)
Quantum	3,255 (37.6%)	5,245 (60.6%)	155 (1.8%)	8,655 (100%)
Architecture	47,266 (39.9%)	67,585 (57.1%)	3,534 (3%)	118,385 (100%)
Education	2,475 (41.9%)	3,117 (52.8%)	308 (5.2%)	5,900 (100%)
Literature	2,145 (41.6%)	2,889 (56.1%)	117 (2.3%)	5,151 (100%)
Greek	4,372 (41%)	5,822 (54.7%)	458 (4.3%)	10,652 (100%)
Bio-chem	4,041 (35.3%)	7,147 (62.5%)	245 (2.1%)	11,433 (100%)
R Basics	9,938 (29.8%)	18,599 (55.7%)	4,846 (14.5%)	33,383 (100%)
Malaria	750 (31.4%)	1,377 (57.5%)	261 (10.9%)	2,388 (100%)
Entrepreneurship	10,393 (45.3%)	11,344 (49.4%)	1,208 (5.3%)	22,945 (100%)
Total	87,920 (38.78%)	127,519 (56.25%)	11,260 (4.97%)	226,699 (100%)

The researcher then coded the three groups of learners as follows:

- 0: one-time visitor

- 1: returning learners

- 2: completers

Independent Variables

Demographic Variables

Five demographic variables were included in the analysis: age, ethnicity, gender, and country. The country variable represented the country in which each learner accessed the course and was used to join data on the Hofstede National Cultural dimensions.

Attitudinal Variables

There are four attitudinal variables in the model: learner perceived value, learner satisfaction, trust, and learner's commitment. As there was no data collected on learner satisfaction and trust, the study only included two factors into the analyses: motives as a proxy for perceived value, and intention of completion as a proxy for commitment.

Motives. In consultation with another expert in the field, the researcher classified each answer in response to the survey question in Table 10 below as work or school related, personal growth, social, English, and reputation. Respondents were able to select all that applied to them.

Table 10.

Coding categories for motives

Work/School Related	Personal Growth	Social	Language	Reputation
Relevant to job	General interest	Meet new people	Improve my English skills	Prestigious school/ professor
Relevant to school or degree program	Personal growth and enrichment	Take with colleagues and friends		
Relevant to academic research	Fun and challenge			
Career change	Experience an online course			
Earn a Certificate				

After classification, each motive was coded dichotomously as follows:

- Work/School Related:

    o 1: not work/school related

    o 0: work/school related

- Personal Growth:

    o 1: not personal growth related

    o 0: personal growth related

- Social:

    o 1: not social related

    o 0: social related

- Language

    o 1: not trying to learn English through the course

   ○ 0: trying to learn English through the course

  • Reputation:

   ○ 1: not taking the course for the university/professor's reputation

   ○ 0: taking the course because of the university/professor's reputation

Intention to complete. Table 11 provides a descriptive analysis of intention of completion. From the table we can see that the mean of three groups of learners increase gradually from 80.04 to 87.74.

Table 11.

Descriptive analysis of intention of completion

Groups	N	Min	Max	Mean	Std.	Percentiles		
						25	50	75
One-time visitor	6,635	0	100	80.04	20.99	70	85	99
Returning learner	24,629	0	100	82.67	20.38	75	90	100
Completer	5,326	0	100	87.74	17.25	81	93	100
Total	36,590	0	100	82.93	20.19	75	90	100

This variable was coded dichotomously as follows:

  • 1: Did not intend to complete the course (0-99%)

  0: Intended to complete the course (100%)

Previous Records of Online Course Completion Variable

Based on the survey question, this variable was coded dichotomously as follows:

  • 1: Had not completed any online course before

  0: Completed at least 1 online course in the past

STEM Category Variable

Based on the characteristics of the courses, this variable was coded dichotomously as follows:

- 1: Non-STEM related courses

- 0: STEM-related courses

Behavioral Variables

Percent of Video Watched. Each learner's interaction data points with the MOOC were exported from clickstream data and converted into behavioral variables, as described below. Specifically, learners' interactions with video lectures, assessments (quiz and peer-reviewed assignment), and discussion forum activity were analyzed. Table 12 provides descriptive analyses of percent video watched among three groups of learners and as a whole. From the table we can see that the mean increases drastically from 3.2 to 57.16. Meanwhile, 25th percentiles of each learner group increase from 0.69 to 38.62; 50th percentiles increase from 1.38 to 62.5; and 75th percentiles increase from 3.45 to 79.19.

Table 12.

Descriptive analyses of percent video watched

Groups	N	Min	Max	Mean	Std.	Percentiles		
						25	50	75
One-time visitor	47,578	0	100	3.2	5.87	0.69	1.38	3.45
Returning learner	102,106	0	100	9.07	12.78	1.38	4.35	10.34
Completer	10,936	0	100	57.16	25.86	38.62	62.5	79.17
Total	160,620	0	100	10.61	18.03	1.04	4.16	9.66

Returning Days. From the clickstream data the researcher converted any action a learner had throughout a given day as one and eliminated the rest of the behavioral interaction on that

same day. After compiling all the days that a learner interacted within the course, the researcher then subtracted one day to calculate the days learners returned to the course. From Table 13 we can see that the means for return days for majority of the courses were around 2 days; with one exception being the Malaria course, in which the average return days was 4 days. The median of almost all the courses were 1 day, with the exception of the Malaria course being 2 days. In terms of standard deviation, we can see that it ranges from 3.49 to 6.62, with Calculus being the lowest, and World Literature being the highest. With regard to the maximum number of the returning days, we can see that it ranges from 50 days (R basic course) to 249 days (Quantum course).

Table 13.

Descriptive Analysis of Returned Days by Course

Course	Mean	Median	SD	Range	Minimum	Maximum	N
Calculus	1.86	1	3.49	55	0	55	7,807
Quantum	2.91	1	6.31	249	0	249	8,655
Architecture	3.05	1	6.10	142	0	142	118,385
Education	2.26	1	3.96	52	0	52	5,900
Literature	2.92	1	6.62	82	0	82	5,151
Greek	2.63	1	5.38	74	0	74	10,652
Bio-chem	3.2	1	5.78	93	0	93	11,433
R Basics	2.29	1	3.08	50	0	50	33,383
Malaria	4.01	2	6.24	54	0	54	2,388
Entrepreneurship	2.15	1	4.38	102	0	102	22,945

Active Days. Table 14 shows descriptive analysis of active days. From the analysis we can see the mean active days for the completer group is almost more than two and a half times the mean for returning learners; the 25th percentiles of active days the completers group is double the

mean for to returning learners, and the 50th and 75th percentiles of active days for completers is approximately tripled that of returning learners. In general, the mean active days for the sample size is 3.78, and most of the learners are active between 1-2 days.

Table 14.

Descriptive analysis of active days by groups of learners

	N	Min	Max	Mean	Std.	Percentiles		
						25	50	75
One-time Visitor	87,920	1	1	1	1	1	1	1
Returning Learner	127,519	2	250	4.89	5.19	2	3	5
Completer	11,260	1	156	12.88	11.67	5	9	18
Total	226,699	1	250	3.78	5.45	1	2	4

Hofstede Cultural Variables

All six cultural dimensions will be listed as separate variables in the data analyses. Specifically speaking, each variable will be recoded as a binary variable with index numbers lower than or equal to 49 coded as zero and index numbers higher than 50 coded as one. For example, in avoidance uncertainty index, China's index is 30 and therefore it will be coded as a zero. In addition, as the index number of 999 in each Hofstede national cultural dimension stands for unknown index, the country with that numeric value will be not included into data analysis. The list below shows all the cultural variables and the recoded values. See Appendix A for a complete list of Hofstede cultural dimensions.

- PDI:
  - 0: 0-49 (low power distance index)
  - 1: 50 and above (high power distance index)

- IDV:

    - 0: 0-49 (individualistic oriented index)

    - 1: 50 and above (collective oriented index)

- MAS:

    - 0: 0-49 (feminine oriented index)

    - 1: 50 and above (masculine oriented index)

- UAI (uncertainty avoidance index):

    - 0: 0-49 (low avoidance index)

    - 1: 50 and above (high avoidance index)

- LTOWVS:

    - 0: 0-49 (short-term oriented index)

    - 1: 50 and above (long-term oriented index)

- IVR:

    - 0: 0-49 (indulgent oriented index)

    - 1: 50 and above (restrained oriented index)

Participants

Total Enrollment

All registrants from the 10 MOOCs were included in the datasets, however, not all the registrants participated in the pre-survey or even interacted with the courses. To be consistent with the study research questions, learners who did not participate in the pre-survey or had no interactions with the course were removed. In the end, 241,900 learners remained and were included in the initial data analyses.

Descriptive analysis

This study begins with descriptive analysis to establish an understanding of the sample population. Analyses of learners' characteristics included gender, ethnicity, age, and educational backgrounds.

Table 15 provides a distribution of learners' enrollment by gender. From the table we can see that in aggregate, more males enrolled in these ten courses (42.5% vs 35.7%). Across the ten courses, half had more male learners: Calculus, Quantum, R-basics, Malaria, and Entrepreneurship. Female learners, on the other hand, had more enrollments in the rest of the ten courses. Similar distributions occur when excluding missing data (see Table 16).

Table 15.

Gender Distribution of each course

Course	Female N (%)	Male N (%)	Unknown N (%)	Missing N (%)	Total N (%)
Calculus	1,397 (17%)	5,012 (60.8%)	50 (1.2%)	1,782 (21%)	8,241 (100%)
Quantum	1,442 (16.7%)	5,041 (58.2%)	61 (0.7%)	2,111 (24.4%)	8,655 (100%)
Architecture	48,990 (40.8%)	43,677 (36.3%)	672 (0.6%)	26,862 (23.3%)	120,201 (100%)
Education	2,677 (34.4%)	1,074 (18.2%)	19 (0.3%)	2,130 (36.1%)	5,900 (100%)
Literature	5,591 (52.5%)	3,264 (30.6%)	100 (0.9%)	1,697 (15.9%)	10,652 (100%)
Greek	2,715 (48%)	2,049 (36.2%)	87 (15.4%)	805 (14.2%)	5,656 (100%)
Bio-chem	4,998 (43.2%)	4,738 (40.1%)	96 (0.8%)	1,746 (15.1%)	11,578 (100%)
R Basics	9,274 (21.2%)	22,908 (52.5%)	159 (0.4%)	11,317 (25.9%)	43,658 (100%)

	Female	Male	Unknown	Missing	Total
Malaria	981 (41.1%)	1,050 (44%)	10 (0.4%)	347 (14.5%)	2,388 (100%)
Entrepreneurship	7,507 (32.7%)	13,147 (57.3%)	92 (0.4%)	2,199 (9.6%)	22,945 (100%)
Total	85,572 (35.7%)	101,960 (42.5%)	1,346 (0.6%)	50,996 (21.2%)	239,874 (100%)

Table 16.

Gender distribution of each course excluding missing data

	Female	Male	Unknown	Total
Course	N (%)	N (%)	N (%)	N (%)
Calculus	1,329 (22%)	4,798 (78%)	46 (1%)	6,173 (100%)
Quantum	1,442 (22%)	5,041 (77%)	61 (1%)	6,544 (100%)
Architecture	48,037 (52%)	42,900 (47%)	656 (1%)	91,593 (100%)
Education	2,677 (71%)	1,074 (28%)	19 (1%)	3,770 (100%)
Literature	5,591 (62%)	3,264 (36%)	100 (1%)	8,955 (100%)
Greek	2,441 (55%)	1,887 (43%)	75 (2%)	4,403 (100%)
Bio-chem	4,936 (51%)	4,676 (48%)	96 (1%)	9,708 (100%)
R Basics	6,833 (28%)	17,102 (71%)	118 (0)	24,053 (100%)
Malaria	981 (48%)	1,050 (51%)	10 (0)	2,041 (100%)
Entrepreneurship	7,507 (36%)	13,147 (63%)	92 (0)	20,746 (100%)
Total	81,774 (46%)	94,939 (53%)	1,273 (1%)	177,986 (100%)

When grouping the courses into STEM categories, we can see from table 17 that among all the Non-STEM oriented courses, 51% were taken by female, and 48% were male; among all the STEM oriented courses, 32% were taken by female, and 67% were taken by male.

Table 17.

Gender distribution of STEM categories excluding missing data

| | | Gender Categorical | | | |
| | | Female | Male | Unknown | Total |
		N (%)	N (%)	N (%)	N (%)
STEM	Non-STEM	66,253 (51%)	62,272 (48%)	942 (1%)	129467 (100%)
	STEM	15,521 (32%)	32,667 (67%)	331 (1%)	48519 (100%)
Total		81,774 (46%)	94,939 (53%)	1273 (1%)	177986 (100%)

Table 18 demonstrated gender distribution by three groups of learners. From the table we can see that among all the females who completed the survey 57.3% were returning learners, and 4.4% were completers and 38.2% were one-time visitors. Among all the males who completed the survey the percentages were similar, with 57.8% returning learners, and 6% completers, and 36.2% one-time visitors.

Table 18.

Gender distribution by groups of learners

| | One-time Visitor | Returning Learner | Completer | Total |
	N (%)	N (%)	N (%)	N (%)
Female	31,269 (38.2%)	46,882 (57.3%)	3,623 (4.4%)	81,774 (100%)
Male	34,372 (36.2%)	54,897 (57.8%)	5,670 (6%)	94,939 (100%)

Unknown	517 (40.6%)	718 (56.4%)	38 (3%)	1,273 (100%)
Total	66,158 (37.2%)	102,497 (57.6%)	9,331 (5.2%)	177,986 (100%)

From Table 19 we can see that across all ten courses 66.4% of learners were between the age of 19 to 34, and this age group comprised two thirds of total enrollments across all courses. Twenty two percent of learners were between the age of 35 and 49. However, it is interesting to note that learners below the age of 18, and above the age of 71 also took part in every course. Furthermore, around 4% of learners below the age of 18 took Calculus course and Quantum course. Approximately 7% to 15% of learners who enrolled were between 50 and 70 years old.

Table 19.

Learner distribution by age

	0-18 N (%)	19-34 N (%)	35-49 N (%)	50-70 N (%)	71+ N (%)	Total N (%)
Calculus	266 (4.2%)	4,363 (69.3%)	1,187 (18.8%)	439 (7%)	45 (0.7%)	6,300 (100%)
Quantum	295 (4.6%)	4,427 (68.8%)	1,094 (17%)	543 (8.4%)	72 (1.1%)	6,421 (100%)
Architecture	1,996 (2.2%)	63,160 (69%)	18,245 (19.9%)	7195 (7.9%)	884 (1%)	91,480 (100%)
Education	35 (0.9%)	1,785 (48.4%)	1,398 (37.9%)	458 (12.4%)	11 (0.3%)	3,687 (100%)
Literature	254 (2.9%)	5,115 (59.2%)	1,889 (21.9%)	1,118 (12.9%)	264 (3.1%)	8,640 (100%)
Greek	133 (2.8%)	2,546 (54.5%)	1,138 (24.3%)	720 (15.4%)	137 (2.9%)	4,674 (100%)
Bio-chem	326 (3.5%	6,850 (72.8%)	1,447 (15.4%)	668 (7.1%)	121 (1.3%)	9,412 (100%)
R Basics	202 (0.7%)	19,305 (62.3%)	8,729 (28.2%)	2,582 (8.3%)	174 (0.6%)	30,992 (100%)

	0-18	19-34	35-49	50-70	71+	Total
Malaria	32 (1.7%	1,045 (55%)	575 (30.3%)	228 (12%)	20 (1.1%)	1,900 (100%)
Entrepreneurship	230 (1.1%)	13,453 (66.7%)	5,276 (26.2%)	1,171 (5.8%)	33 (0.2%)	20,163 (100%)
Total	3,769 (2.1%)	122,049 (66.4%)	40,978 (22.3%)	15,122 (8.2%)	1761 (1%)	183,679 (100%)

Table 20 presented learners' age distribution by groups of learners. From the table we can

see that among all the learners who were below the age of 18, 51.3% were returning learners and

3.9% were completers; among all the learners who were between the age of 19 and 34, 56.4% were

returning learners, and 4.7% were completers; among the learners who were between the age of

35 and 49, 59.8% were returning learners, and 6.1% were completers; for learners who were

between the age of 50 and 70, 63.2% were returning learners and 7.7% were completers; among

the learners who were above 71 year's old, 57.7% were returning learners, and 7% were completers.

It's quite interesting to see that as age increased, the percent of learners who were returning

learners and completers also increased.

Table 20.

Learner age distribution by groups of learners

	Groups of Learners			
	One-time Visitor	Returning Learner	Completer	Total
	N (%)	N (%)	N (%)	N (%)
0-18	1,640 (44.8%)	1,880 (51.3%)	144 (3.9%)	3,664 (100%)
19-34	44,856 (38.9%)	65,117 (56.4%)	5,461 (4.7%)	115,434 (100%)
35-49	13,027 (34.1%)	22,876 (59.8%)	2,328 (6.1%)	38,231 (100%)

50-70	4,159 (29.1%)	9,037 (63.2%)	1,108 (7.7%)	14,304 (100%)
71+	401 (23.6%)	1,177 (69.4%)	119 (7%)	1,697 (100%)
Total	64,083 (37%)	100,087 (57.7%)	9,160 (5.3%)	173,330 (100%)

Table 21 provides a distribution representing ethnicity for learners who completed the survey. From the table we can see that in general, 53.3% of learners who took the courses were White, and 14.6% were Asian. Among all the seven courses, around 16.2% of African American learners took the entrepreneurship courses, which was approximately double African American enrollments in most other courses. Twenty percent of Asian learners on average took each course; however, only 9.3% of Asian learners took the Architecture course. Furthermore, 12.2% of Other Hispanic learners took the entrepreneurship course, which is approximately double Hispanic enrollments in all other courses.

Table 21.

Ethnicity Distribution

	African American	Alaskan/ Native American	Asian	Hawaii/ Pacific islander	Mexican	Other Hispanic	Other	White	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Calculus	30 (7.7%)	10 (2.6%)	80 (20.6%)	2 (0.5%)	29 (7.5%)	17 (4.4%)	32 (8.2%)	188 (48.5%)	388 (100%)
Quantum	12 (4.5%)	5 (1.9%)	45 (16.9%)	1 (0.4%)	15 (5.6%)	14 (5.3%)	11 (4.1%)	163 (61.3%)	266 (100%)
Architecture	288 (6.5%)	78 (1.8%)	411 (9.3%)	41 (0.9%)	267 (6%)	431 (9.7%)	239 (5.4%)	2,677 (60.4%	4,432 (100%)
Education				N/A					
Literature				N/A					
Greek				N/A					
Bio-chem	104 (9.2%)	26 (2.3%)	203 (17.9%)	7 (0.6%)	69 (6.1%)	89 (7.9%)	74 (6.5%)	559 (49.4%)	1,131 (100%)
R Basics	83 (8.5%)	18 (1.8%)	271 (27.6%)	5 (0.5%)	36 (3.7%)	64 (6.5%)	51 (5.2%)	454 (46.2%)	982 (100%)
Malaria	25 (11.1%)	3 (1.3%)	31 (13.7%)	0	9 (4%)	22 (9.7%)	13 (5.8%)	123 (54.4%)	226 (100%)
Entrepreneurship	193 (16.2%)	24 (2%)	219 (18.4%)	10 (0.8%)	64 (5.4%)	145 (12.2%)	108 (9.1%)	429 (36%)	1,192 (100%)
Total	735 (8.5%)	164 (1.9%)	1260 (14.6%)	66 (0.8%)	489 (5.7%)	782 (9.1%)	528 6.1%)	4593 (53.3%)	8,617 (100%)

From Table 22 we can see learners' ethnicity distribution by groups of learners. Among all the learners who participated in the survey, nearly every single ethnic learner group had 70% of returning learners except the Alaskan/ Native American group. When it comes to completers, several ethnic groups had more than 8% of completers within their ethnic groups: African American, Asian, Alaskan/Native American, Pacific Islander, and White. Among all the other

Hispanic learners, 9.5% of the survey participants were completers. In addition, among all the Hispanic learners, 4.4% of them were completers, and 6% of other ethnic group learners were completers. In general, among all the survey participants, 20.7% of them were one-time visitors, 71.5% of them were returning learners, and 7.8% were completers.

Table 22.

Ethnicity Distribution by groups of learners

	Groups of Learners			
	One-time Visitor	Returning Learner	Completer	Total
	N (%)	N (%)	N (%)	N (%)
African American	130 (19.6%)	479 (72.2%)	54 (8.1%)	663 (100%)
Asian	224 (22%)	711 (70%)	81 (8%)	1,016 (100%)
Alaskan/Native American	41 (28.1%)	94 (64.4%)	11 (7.5%)	146 (100%)
Hispanic	102 (22.6%)	330 (73%)	20 (4.4%)	452 (100%)
Other Hispanic	138 (19.3%)	508 (71.1%)	68 (9.5%)	714 (100%)
Other	97 (20.2%)	354 (73.6%)	30 (6.2%)	481 (100%)
Pacific Islander	17 (27%)	41 (65.1%)	5 (7.9%)	63 (100%)
White	843 (20.3%)	2,989 (71.8%)	330 (7.9%)	4,162 (100%)
Total	1,592 (20.7%)	5,506 (71.5%)	599 (7.8%)	7,697 (100%)

From Table 23 we can see that approximately 28.5% of the learners had a bachelor's degree, 16.8% had a high school diploma, and 19% of the learners had a master's degree. Something interesting to mention that approximately 2.8% of the learners had a doctoral degree, while 12.2%

of the learners took Malaria course had a doctoral degree. In addition, approximately 20% of enrollments in calculus, quantum, architecture, literature, Greek mythology, biochemistry, and entrepreneurship courses held high school diplomas as their highest educational credential, and across all courses this group was the second largest category of enrollments.

Table 23.

Educational Background Distribution

	No formal	Elementary	Middle School	High School	Associate	Bachelors	Masters	PhD	Other	Missing	Total
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Calculus	27 (.3)	30 (.4)	337 (4.1)	1,898 (23)	376 (4.6)	2,020 (24.5)	1,173 (14.2)	189 (2.3)	138 (1.7)	2053 (24.9)	8,241 (100)
Quantum	28 (.3)	58 (.7)	331 (3.8)	1,732 (20)	288 (3.3)	1,845 (21.3)	1,355 (15.7)	522 (6)	115 (1.3)	2,381 (27.5)	8,655 (100)
Architecture	186 (.2)	351 (.3)	2,798 (2.3)	21,840 (18.2)	6,771 (5.6)	34,463 (28.7)	19,859 (16.5)	1824 (1.5)	1,914 (1.6)	30,195 (25.1)	120,201 (100)
Education	6 (.1)	12 (.2)	37 (.6)	442 (7.5)	246 (4.2)	1,434 (24.3)	1,251 (21.2)	135 (2.3)	85 (1.4)	2,252 (38.4)	5,900 (100)
Literature	29 (.3)	47 (.4)	328 (3.1)	1,935 (18.2)	480 (4.5)	2,936 (27.6)	2,413 (22.7)	399 (3.7)	133 (1.2)	1,952 (18.3)	10,652 (100)
Greek	5 (.3)	7 (.4)	48 (2.6)	320 (17.2)	79 (4.2)	467 (25.1)	391 (21)	84 (4.5)	32 (1.7)	426 (22.9)	1,859 (100)
Bio-chem	26 (.2)	60 (.5)	508 (4.4)	2,765 (23.9)	589 (5.1)	2,988 (25.8)	1,645 (14.2)	608 (5.3)	189 (1.6)	2,200 (19)	11,578 (100)
R Basics	12 (.1)	15 (.1)	89 (0.7)	1,272 (10)	286 (2.2)	3,881 (30.4)	3,602 (28.2)	756 (5.9)	102 (.8)	2768 (21.7)	9,583 (100)
Malaria	3 (.1)	2 (.1)	44 (1.8)	252 (10.6)	78 (3.3)	628 (26.3)	665 (27.8)	292 (12.2)	29 (1.2)	395 (16.5)	2,388 (100)
Entrepreneurship	25 (.1)	34 (.1)	411 (1.8)	3,827 (17.6)	1,575 (6.9)	8,310 (36.2)	5,238 (22.8)	450 (2)	313 (1.4)	2,762 (12)	22,945 (100)
Total	388 (.2)	681 (.3)	5269 (2.2)	40,265 (16.8)	11,569 (4.8)	68,427 (28.5)	45,653 (19)	6,789 (2.8)	3,346 (1.4)	574,87 (24)	239,874 (100)

Table 24 shows learners' distribution of educational background by groups of learners. From the table we can see that for every educational group more than 50% were returning learners. Learners who had a bachelor's, master's and doctoral degrees comprised approximately 52% of the returning learners. In addition, among all the completers' groups, 7% of the completers were learners who had master's degree or doctorate degrees.

Table 24.

Distribution of educational background by groups of learners

	Groups of Learners			
	One-time Visitor	Returning Learner	Completer	Total
	N (%)	N (%)	N (%)	N (%)
No formal education	164 (44.4%)	190 (51.5%)	15 (4.1%)	369 (100%)
Elementary School	291 (44.4%)	339 (51.7%)	26 (4%)	656 (100%)
Middle School	2,257 (44.2%)	2,681 (52.5%)	164 (3.2%)	5,102 (100%)
High School	14,936 (38.7%)	21,979 (57%)	1,655 (4.3%)	38,570 (100%)
Associate	4,783 (42.9%)	5,994 (53.7%)	382 (3.4%)	11,159 (100%)
Bachelor	23,939 (37.2%)	37,086 (57.7%)	3,299 (5.1%)	64,324 (100%)
Master or Professional	13,894 (32.9%)	25,428 (60.2%)	2,947 (7%)	42,269 (100%)
Doctorate	1,889 (30.7%)	3,774 (61.4%)	488 (7.9%)	6,151 (100%)
Other education	1,310 (41.1%)	1,785 (55.9%)	96 (3%)	3,191 (100%)
Missing	24,457 (44.5%)	28,263 (51.5%)	2,188 (4%)	54,908 (100%)
Total	87,920 (38.8%)	127,519 (56.3%)	11,260 (5%)	226,699 (100%)

Valid cases for data analysis

Descriptive analysis

To be consistent with data analyses, variables related to research questions that included missing data were excluded. The sample size for data analyses therefore decreased to 19,582. The tables below present descriptive analyses for the valid cases in comparison with the total enrollment.

Table 25 presents the differences between the total enrollments and the valid cases used in this study's analyses. From the table we can see that returning learners and completers increased within the overall percentage in the valid cases as compared with total enrollments.

Table 25.

Comparison three learning groups for valid cases and the total enrollment

Groups of learners	Valid Cases N (%)	Total Enrollment N (%)
One-Time Visitor	3,018 (15.4)	87,920 (38.8)
Returning Learners	14,466 (73.9)	127,519 (56.3)
Completers	2,098 (10.7)	11,260 (5)
Total	19,582 (100)	226,699 (100)

From 26 we can see that data was missing from Education, Literature and Greek courses as those courses did not include survey in their courses. The three courses, therefore, got eliminated for the data analyses.

Table 26.

Distribution of Course by groups of learners between valid cases and total enrollment

	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Calculus	227 (7.5)	3285 (3.7)	532 (3.7)	4394 (3.4)	35 (1.7)	128 (1.1)
Quantum	23 (0.8)	3,255 (3.7)	316 (2.2)	5,245 (4.1)	35 (1.7)	155 (1.4)
Architecture	1,687 (55.9)	47,266 (53.8)	9,692 (67)	67,585 (53)	1,306 (62.2)	3,534 (31.4)
Education	N/A	2,475 (2.8)	N/A	3117 (2.4)	N/A	308 (2.7)
Literature	N/A	4,372 (5)	N/A	5,822 (4.6)	N/A	458 (4.1)
Greek	N/A	2,145 (2.4)	N/A	2,889 (2.3)	N/A	117 (1)
Bio-chem	191 (6.3)	4,041 (4.6)	1039 (7.2)	7,147 (5.6)	70 (3.3)	245 (2.2)
R Basics	70 (2.3)	9,938 (11.3)	164 (1.1)	18,599 (14.6)	41 (2)	4,846 (43)
Malaria	28 (0.9)	750 (0.9)	220 (1.5)	1,377 (1.1)	84 (4)	261 (2.3)
Entrepreneurship	792 (26.2)	10,393 (11.8)	2,503 (17.3)	11,344 (8.9)	527 (25.1)	1,208 (10.7)
Total	3,018 (100)	87,920 (100)	14,466 (100)	127,519 (100)	2,098 (100)	11,260 (100)

Table 27 shows distribution of gender by groups of learners between valid cases and the total enrollment. From the table we can see that female learners represented a slightly higher percentage of learners in the valid cases across three groups of learners.

Table 27.

Distribution of gender by groups of learners comparing valid cases and the total enrollment

Gender	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Female	1,256 (41.6)	31,269 (35.6)	6,255 (43.2)	46,882 (36.8)	883 (42.1)	3,623 (32.2)
Male	1,335 (44.2)	34,372 (39.1)	6,325 (43.7)	54,897 (43.1)	1,039 (49.5)	5,670 (50.4)
Unknown	19 (0.6)	517 (0.6)	74 (0.5)	718 (0.6)	2 (0.1)	38 (0.3)
Missing	408 (13.5)	21,762 (24.8)	1,812 (12.5)	25,022 (19.6)	174 (8.3)	1,929 (17.1)
Total	3,018 (100)	87,920 (100)	14,466 (100)	127,519 (100)	2,098 (100)	11,260 (100)

Table 28 compares the distribution of age groups between valid cases and the total enrollment by the three groups of learners. From the table we can see that learners in both valid cases and the total enrollment share similar distribution in age categories.

Table 28.

Distribution of Age Group by groups of learners between valid cases and the total enrollment

	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)

	One-Time Visitor		Returning Learners		Completers	
0-18	78	1,640	276	1,880	30	144
	(3)	(2.6)	(2.2)	(1.9)	(1.6)	(1.6)
19-34	1,829	44,856	8,285	65,117	1,197	5,461
	(71.4)	(70)	(66.5)	(65.1)	(63)	(59.6)
35-49	480	13,027	2,691	22,876	457	2,328
	(18.7)	(20.3)	(21.6)	(22.9)	(24)	(25.4)
50-70	160	4,159	1,070	9,037	198	1,108
	(6.2)	(6.5)	(8.6)	(9)	(10.4)	(12.1)
70+	16	401	128	1,177	19	119
	(0.6)	(0.6)	(1)	(1.2)	(1)	(1.3)
Total	2,563	64,083	12,450	100,087	1,901	9,160
	(100)	(100)	(100)	(100)	(100)	(100)

Table 29 compares STEM and Non-STEM learners in valid cases and the total enrollment by three groups of learners. From the table we can see that non-STEM learners appear to be slightly overrepresented in the valid cases, in One-time Visitors and Repeat Learners, more highly overrepresented among completers. Correspondingly, STEM learners are slightly to moderately underrepresented. This might be caused by the elimination of the three courses that did not include complete set of pre-survey. On the other hand, the number of STEM related videos did not change (556 videos) and the number non-STEM videos reduced to 132 videos.

Table 29.

Distribution of STEM Category by groups of learners between valid cases and total enrollment

	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Non-STEM	2,479 (82.1)	66,651 (75.8)	12,195 (84.3)	90,757 (71.2)	1,833 (87.4)	5,625 (50)

	STEM					
STEM	539	21,269	2,271	36,762	265	5,635
	(17.9)	(24.2)	(15.7)	(28.8)	(12.6)	(50)
Total	3,018	87,920	14,466	127,519	2,098	11,260
	(100)	(100)	(100)	(100)	(100)	(100)

Table 30 presents distributions of educational achievements by groups of learners between valid cases and the total enrollment. From the table we can see that learners in modified sample decreased slightly in every educational group.

Table 30

Distribution of Educational Achievements by groups of learners between valid cases and the total enrollment

	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
None	5 (0.2)	16 (0.2)	10 (0.1)	27 (0.1)	1 (0.0)	1 (0.0)
Elementary	23 (0.8)	38 (0.5)	38 (0.3)	62 (0.2)	2 (0.1)	5 (0.1)
Middle	93 (3.1)	235 (2.9)	355 (2.5)	600 (2.1)	44 (2.1)	81 (1.4)
High	651 (21.6)	1529 (18.6)	2859 (19.8)	5078 (17.8)	377 (18)	702 (12.3)
Associate	59 (2)	147 (1.8)	245 (1.7)	451 (1.6)	32 (1.5)	63 (1.1)
Some College	340 (11.3)	789 (9.6)	1403 (9.7)	2599 (9.1)	138 (6.6)	371 (6.5)
Bachelors	913 (30.3)	2622 (31.9)	4516 (31.3)	9071 (31.8)	629 (30)	1839 (32.2)
Professionals	305 (10.1)	742 (9)	1826 (12.6)	3022 (10.6)	289 (13.8)	582 (10.2)

	One-Time Visitor		Returning Learners		Completers	
Masters	547 (18.1)	1725 (21)	2765 (19.1)	6321 (22.1)	493 (23.5)	1685 (29.5)
PhD	75 (2.5)	276 (3.4)	417 (2.9)	1109 (3.9)	88 (4.2)	353 (6.2)
Total	3015 (100)	8230 (100)	14446 (100)	28561 (100)	2095 (100)	5705 (100)

Table 31 demonstrated the distribution of cultural dimension index on both valid cases and the total enrollment. From the table we can see that one-time visitors in the valid cases tended to have less learners from countries with high power dimensions, more learners from individualistic countries, less long-term oriented countries, more learners from countries that are comfortable with uncertainties, and more learners from countries that are restraint-oriented. In terms of returning learners, the difference between modified sample and total sample is very slight. With completers we can see that the valid cases consisted of an increased distribution of learners from high power distance index countries, more individualistic-oriented, more masculine-oriented, more long-term oriented, more comfortable with uncertainty, and more restraint-oriented.

Table 31.

Distribution of Cultural Dimensions by groups of learners between modified sample and total sample

	One-Time Visitor		Returning Learners		Completers	
	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment	Valid Cases	Total Enrollment
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
High PDI	1731 (57.4)	49779 (62.8)	8259 (57.1)	65582 (57.7)	1230 (58.6)	5380 (51.9)

	One-Time Visitor		Returning Learners		Completers	
High IDV	1410 (46.7)	32430 (40.9)	6790 (46.9)	53683 (47.2)	968 (46.1)	5599 (54)
High MAS	1963 (65)	49204 (62.1)	9554 (66)	74387 (65.4)	1355 (64.6)	7260 (70)
High ITOWVS	740 (24.5)	23396 (30.2)	3892 (26.9)	35497 (31.8)	608 (29)	3371 (33.1)
High UAI	1584 (52.5)	44741 (56.4)	7813 (54)	60218 (52.9)	1209 (57.6)	5109 (49.3)
High IVR	2125 (70.4)	47139 (62.9)	10264 (71)	68725 (63.8)	1445 (68.9)	6493 (65.3)

Data Analysis

Table 32 below indicates the quantitative methods employed in the analysis of each research question.

Table 32.

Data analysis matrix by research question

Research Question	Variable(s)	Coding	Method(s)
1. Are the number of active days different for completers and returning learners?	a. Learner Groups b. Active days	1: returning learners (dummy) 2: completers	a. Descriptive analysis b. Independent Sample T-Test

2. Are one-time visitors, returning learners, and completers different with regard to whether or not they had previously taken online courses?	a. Learner Groups
	b. MOOCs previously completed
	c. STEM Category
	d. Motives
	d. % Intention to complete
	e. Actual % video completion
	f. Hofstede cultural dimensions
		a. Learner Groups
		  0: one-time visitor (dummy)
		  1: returning learner
		  2: completers
		b. MOOCs Completed
		c. Motives
		  • Work/school:
		  1: no
		  0: yes
		  • Personal growth:
		  1: no
		  0: yes
			a. Descriptive analysis
			b. Multinomial logistic regression

Research Question	Variable(s)	Coding	Method(s)

		• Social:
		  1: no
		  0: yes
		• English:
		  1: no
		  0: yes
		• Reputation:
		  1: no
		  0: yes
		d. % Intention to complete:
		  1: 0-99%
		  0: 100%
		e. Actual percent video completion
		f. Hofstede cultural dimensions:
		  • PDI:
		    1: 0-49
		    0: 50 and above
		  • IDV:
		    1: 0-49
		    0: 50 and above
		  • MAS:
		    1: 0-49
		    0: 50 and above
		  • UAI:
		    1: 0-49
		    0: 50 and above
		  • LTOWVS:
		    1: 0-49
		    0: 50 and above
		  • IVR:
		    1: 0-49
		    0: 50 and above	

3. Is the distribution of one-time visitors, returning learners, and completers different in STEM and non-STEM courses?	a. Learner Groups b. STEM Category		a. Descriptive analysis b. Multinomial logistic regression

Research Question	Variable(s)	Coding	Method(s)
4. Do one-time visitors, returning learners, and completers differ with respect to reasons for taking the course?	a. Learner Groups b. Motives		a. Descriptive analysis b. Multinomial logistic regression
5. Do one-time visitors, returning learners, and completers intend to and actually complete similar percentages of the course? And what are the differences?	a. Learner Groups b. % Intention to complete c. Actual % video completion		a. Descriptive analysis b. Multinomial logistic regression
6. What are the relationships between three groups of learners, number of MOOCs previously completed, motives for taking the courses, intention to complete and actual completion?	a. Learner Groups b. MOOCs previously completed c. STEM Category d. Motives d. % Intention to complete e. Actual % video completion		a. Descriptive analysis b. Multinomial logistic regression
7. Are the relationships between the three groups of learners and cultural attributes?	a. Learner Groups b. Hofstede cultural dimensions		a. Descriptive analysis b. Multinomial logistic regression

Analysis for research question 1

First, the researcher conducted descriptive analysis to capture the characteristics of the returning learner and completer groups of learners. Then, the researcher conducted an independent sample T-Test to determine whether the two groups are statically significantly different.

Analysis for research question 2

As indicated in the variable section, the researcher then classified the records as 1 representing learners who never took an online course, and 0 representing learners who took one or more online course previously. The researcher then conducted multinomial logistic regression to determine whether the three groups are statistically significantly different in terms of the records of online course taken previously. The variables were coded dichotomously due to the complexity of multinomial logistic regression. Analyzing binary variables facilitates the interpretation of the data analyses.

Analysis for research question 3

The researcher first conducted descriptive analysis to demonstrate the distributions of three groups of learners and STEM categories. Then, the researcher conducted a multinomial logistic regression to determine if there was any difference between the three groups of learners and STEM categories.

Analysis for research question 4

The researcher conducted a multinomial logistic regression to investigate the relationships between the three groups of learners and different categories of motives. As indicated in the variable section, different categories of motives were coded dichotomously: 1 representing learners who had not selected that motive category, and 0 representing learners who had selected that motive category.

Analysis for research question 5

Part 1

The researcher first conducted descriptive analysis to understand the percent of intention to complete across the three groups of learners, then the researcher conducted multinomial

logistic regression to test whether they are statistically significantly different. As indicated in the variable section, the percent of intention was coded dichotomously: 1 as 0-99%, and 0 as 100%.

Part 2

The researcher first conducted descriptive analysis to understand the actual percent of course videos completed by the three groups of learners, then the researcher conducted multinomial logistic regression to test whether they are statistically significantly different.

Analysis for research question 6

The researcher conducted multinomial logistic regression to explore the relationships among the three groups of learners and other attitudinal and behavioral variables. The variables included history of completing online course, STEM categories, categories of motives, intention of completion, actual video completion and active days.

Analysis for research question 7

The researcher conducted multinomial logistic regression to explore the relationship between cultural attributes and three groups of learners. As indicated in the variable section, the culture attributes used here were the Hofstede Cultural Dimensions. Each cultural index was coded dichotomously with 1 representing 0-49, and 0 representing 50 and above.

Summary

This chapter described the methodology used in this study. Specifically speaking, this study utilized quantitative method to analyze survey data and clickstream data of ten MOOCs from HarvardX. A series of statistical analyses, including as descriptive analyses and multinomial logistic regression, to answer relevant research questions. The next chapter provides detailed results for each research question.

Chapter 4: Results

This study sought to understand whether learners perceived the MOOCs they enrolled in as valuable even when they did not complete the course, through responses to a pre-survey fully completed by learners who took seven HarvardX courses and the clickstream data representing their actions during the courses. This chapter provides a detailed summary of the data collected and analyzed using the methods described in Chapter 3. An independent sample T-test, descriptive analyses, and a multinomial logistic regression method were adopted to explore learners' behaviors and perceptions based on pre-survey data, clickstream data, and the countries they from which they took the courses, using the Hofstede Cultural Dimensions index. The chapter concludes with a summary of the findings.

Results by Research Questions

RQ1. Are the number of active days different for completers and returning learners?

This research question compared completers and returning learners in terms of the number of active days. An independent-samples t-test was conducted to compare active days for returning learners and completers. From Table 33 we can see that there was a significant difference in the active days for returning learners (M= 6.75, SD =6.698, N=14,466) and completers (M=18.31, SD = 12.313); t (16562) = -64.728, p<.001, two-tailed. The 95% confidence interval around difference between the group means was (-11.903, -11.204). See Figure 3 for a boxplot comparison between the two groups of learners. From the figure we can see that completers in general had almost three times more active days and the highest number of active days, while a number of returning learner outliers were very active between day 18 to day 70, and the highest number of active days for returning learner is 105 days (see Appendix B for a detailed frequency table).

Table 33.

Independent Sample t-test analysis of active days by returning learners and completer

Groups of Learners	N	Mean	SD	t	df	p	95% Confidence Interval
Returning Learner	14,466	6.75	6.698	-64.728	16562	.000	[-11.903, -11.204]
Completer	2,098	18.31	12.313				

Figure 3.

Boxplot comparison of Returning Learners and Completers on number of active days
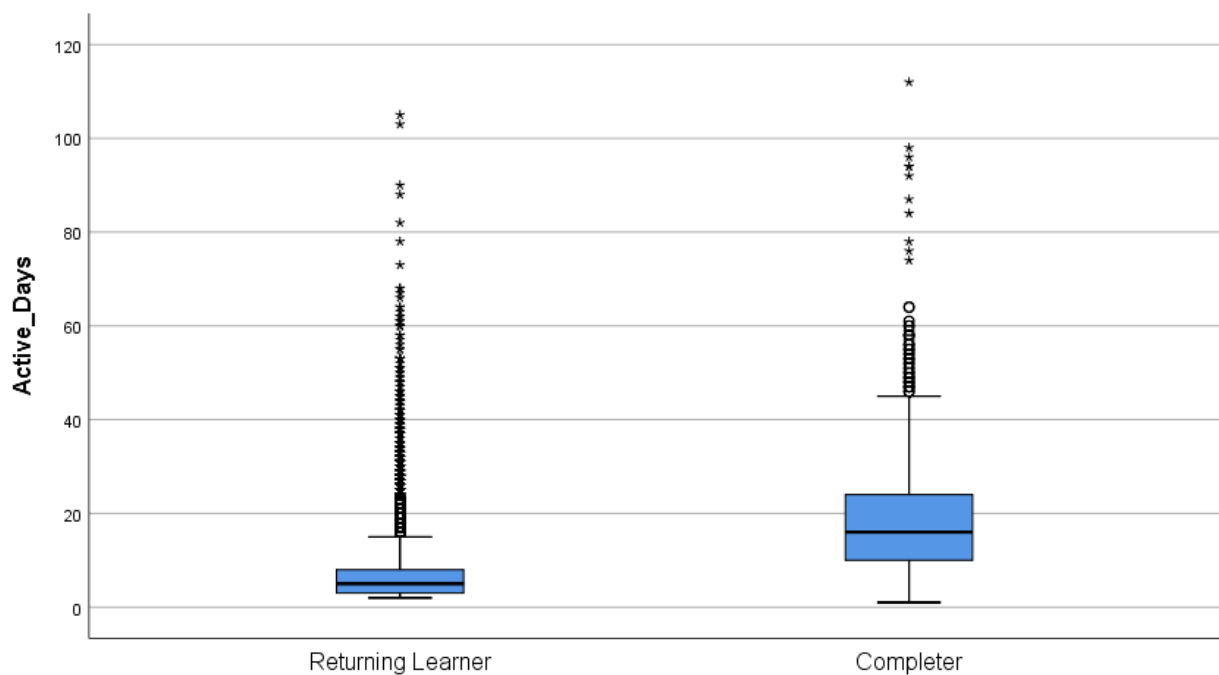
RQ2. Are one-time visitors, returning learners, and completers different with regard to whether or not they had previously taken online courses?

This research question intends to understand whether the three learner groups are different with regard to the history of online courses previously completed. A descriptive

analysis and a multinomial logistic regression were conducted to explore their relationships. (See Appendix D for detailed frequency table and Appendix C for logistic regression information.) As indicated in Chapter 3, for the multinomial logistic regression analysis, the variable of previously taken online courses have been recoded with 1 representing learners who had taken at least one online course before; and 0 representing learners who had never taken an online course. From Table 34 we can see that returning learners and completers presented similar behavioral patterns with regard to online course previously completed: 40% of returning learners and 42% of completers completed at least one online course prior to taking the MOOC.

A multinomial logistic regression was calculated to identify the differences among one-time visitors, returning learners and completers with regard to their history of taking an online course. The model created included one dependent variable of one-time visitor (reference group), returning learners or completer groups and one independent or predictor variable, whether the learners had previously taken an online course or not. The groups of learners were significantly different and with regard to having previously taken online courses. This analysis, based on comparison with one-time visitors, reveals that learners who had taken an online course before were 3% more likely to be returning learners. (See Table 34 for a condensed version, and Appendix G for the full version).

Table 34.

Multinomial logistic regression analysis of one-time visitors, returning learners, and completers by records of previously completed online courses, STEM vs non-STEM courses, motives,

intended percentage of MOOC completion, actual video completion, and cultural attributes (n =

19,582)

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
		Returning Learners vs One-Time Visitors		
Intercept		.213 .335		
Completed Online Courses?				
Yes	.4 (.489)	.176 .044	1.193 [1.094, 1.301]	3% [2%, 3%]
No	.6 (.489)	rc[2]		
In STEM category?				
Yes	.16 (.364)	-.192 .056	.826 [.739, .922]	-3% [-4%, -2%]
No	.84 (.364)	rc		
Intend to Complete MOOC?				
Yes	.31 (.462)	.257 .049	1.294 [1.175, 1.425]	4% [3%, 4%]
No	.69 (.462)	rc		
% Videos Watched	9.08 (10.97)	.199 .007	1.22 [1.203, 1.237]	3% [3%, 3%]
Masculinity vs Femininity?				
Masculinity	.66 (.474)	.151 .055	1.163 [1.044, 1.296]	2% [1%, 3%]
Femininity	.34 (.474)	rc		
Uncertainty Avoidance Index?				
Avoid low uncertainty	.54 (.498)	.165 .056	1.18 [1.056, 1.318]	2% [2%, 3%]

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
Avoid high uncertainty	.46 (.498)	rc		
Long-Term vs Short-Term?				
Long-Term	.27 (.443)	.207 .060	1.230 [1.093, 1.383]	3% [2%, 4%]
Short-Term	.72 (.443)	rc		

Completers vs One-Time Visitors

Intercept		-5.412 .656		
In STEM category?				
Yes	.13 (.332)	-1.563 .146	.21 [.158, .279]	-38% [-41%, -34%]
No	.87 (.332)	rc		
Work Motive to Enroll?				
Yes	.96 (.205)	1.451 .162	4.268 [3.107, 5.862]	35% [31%, 39%]
No	.04 (.205)	rc		
Motivated to Learn English?				
Yes	.48 (.5)	.268 .092	1.307 [1.091, 1.566]	6% [4%, 9%]
No	.52 (.5)	rc		
Motivated to Enroll by Reputation of Institution or Professors?				
Yes	.86 (.349)	.352 .111	1.422 [1.144, 1.767]	9% [6%, 11%]
No	.14 (.349)	rc		
Intend to Complete MOOC?				
Yes	.52 (.5)	1.062 .084	2.893 [2.454, 3.410]	26% [24%, 28%]
No	.48 (.5)	rc		

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
% Videos Watched	47.49 (26.178)	.309 .007	1.363 [1.343, 1.383]	7% [7%, 8%]
Uncertainty Avoidance Index?				
Avoid low uncertainty	.58 (.494)	.364 .104	1.439 [1.174, 1.765]	9% [6%, 11%]
Avoid high uncertainty	.42 (.494)	rc		
Long-Term vs Short-Term?				
Long-Term	.29 (.454)	.268 .113	1.307 [1.048, 1.631]	6% [4%, 9%]
Short-Term	.71 (.454)	rc		

Source: 7 HarvardX MOOCs

[1] First derivative of the multinomial logistic function at the mean value of the dependent variable from equation 2.10 (Amemiya, 1981).

[2]rc = reference category

RQ3. Is the distribution of one-time visitors, returning learners, and completers different in STEM and non-STEM courses?

This research question intends to understand whether three learner groups are different when it comes to STEM and non-STEM courses. A descriptive analysis and a multinomial logistic regression were conducted to explore their relationships. From Table 34, we can see that 16% of returning learners enrolled in STEM oriented courses and 13% of completers enrolled in STEM oriented courses.

Multinomial logistic regression was conducted to identify the differences among one-time visitors, returning learners and completers in terms of the STEM and Non-STEM MOOC categories. From table 34 we can see that, the differences between groups of learners by MOOC categories were statistically significantly different. Specifically speaking, compared with one-

time visitors, learners who took STEM courses were 3% less likely to be returning learners; 38% less likely to be completers (see Figure 4).

Figure 4.

Probability comparison of STEM and Non-STEM categories by three groups of learners
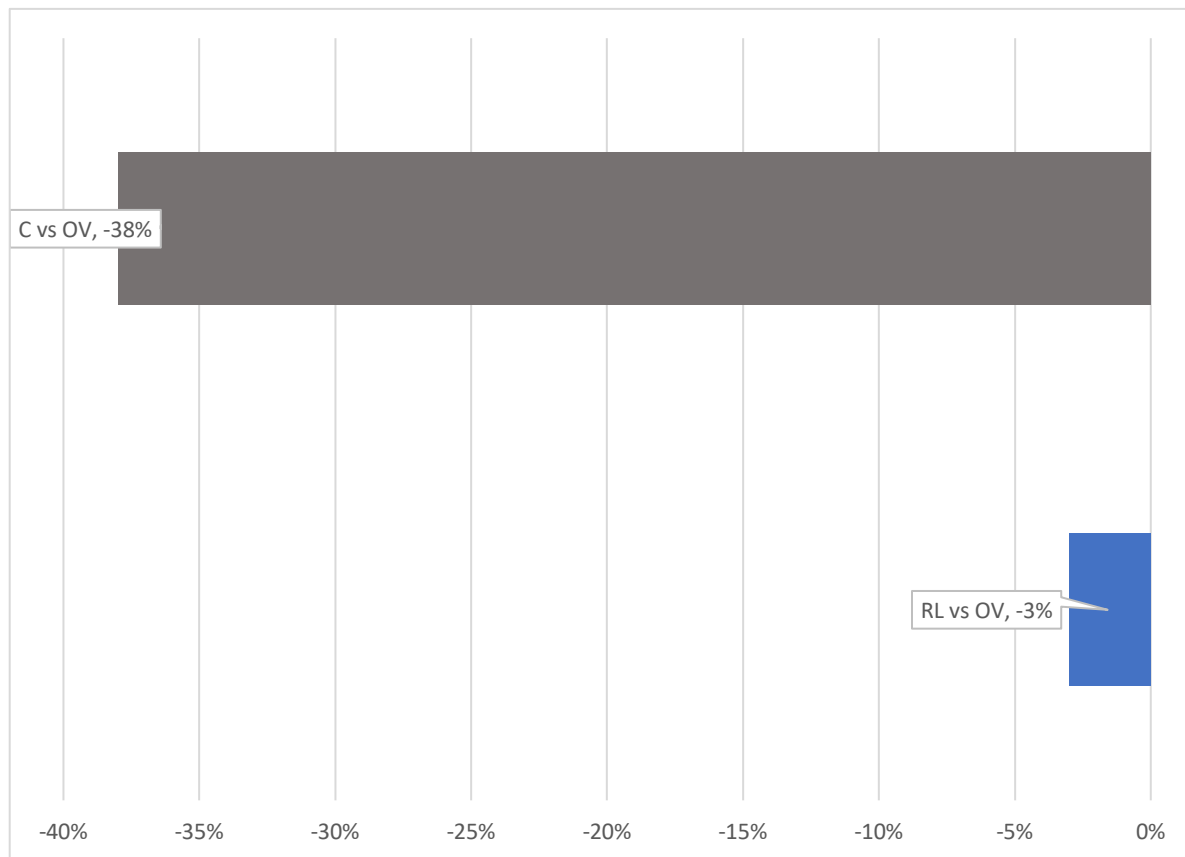
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

RQ4. What are students' motives for taking these courses? Do one-time visitors, returning learners, and completers differ with respect to reasons for taking the course?

This research question intends to understand whether three groups of learners are different when learners reported different motives for enrolling in the course. As indicated in Chapter 3, this study categorized five categories of motives: work related, social, personal,

language related, and reputation related. Each category was coded dichotomously and analyzed through a descriptive analysis and several multinomial logistic regressions were conducted to explore their relationships.

In Table 34 we can see the distribution of each motive category by learner group. From the table we can see that 86% of returning learners and 96% of completers selected work related motives to enroll the course; 99% of both returning learners and completers selected personal motive to enroll the course; 37% of returning learners and 40% of completers selected social related motive to enroll the course; 47% of returning learners and 48% of completers selected learning English as a motive to enroll the course; and 78% of returning learners and 86% of completers selected to enroll based on reputation of institutions or professors.

Table 34 and Figure 5 explored the relationship between the three groups of learners and different types of motives. Based on the results we can see that compared with one-time visitors, learners who considered work-related motives were 35% more likely to be completers; learners who considered learning English as a motive to enroll the course were six percent more like to be completers; and learners selected universities/professor's reputation as a motive to enroll a MOOC were nine percent more likely to be completers. Returning learners, on the other hand, had no statistically significant differences compared with one-time visitors on different motive attributes.

Figure 5.

Probability comparison of motive categories by three groups of learners
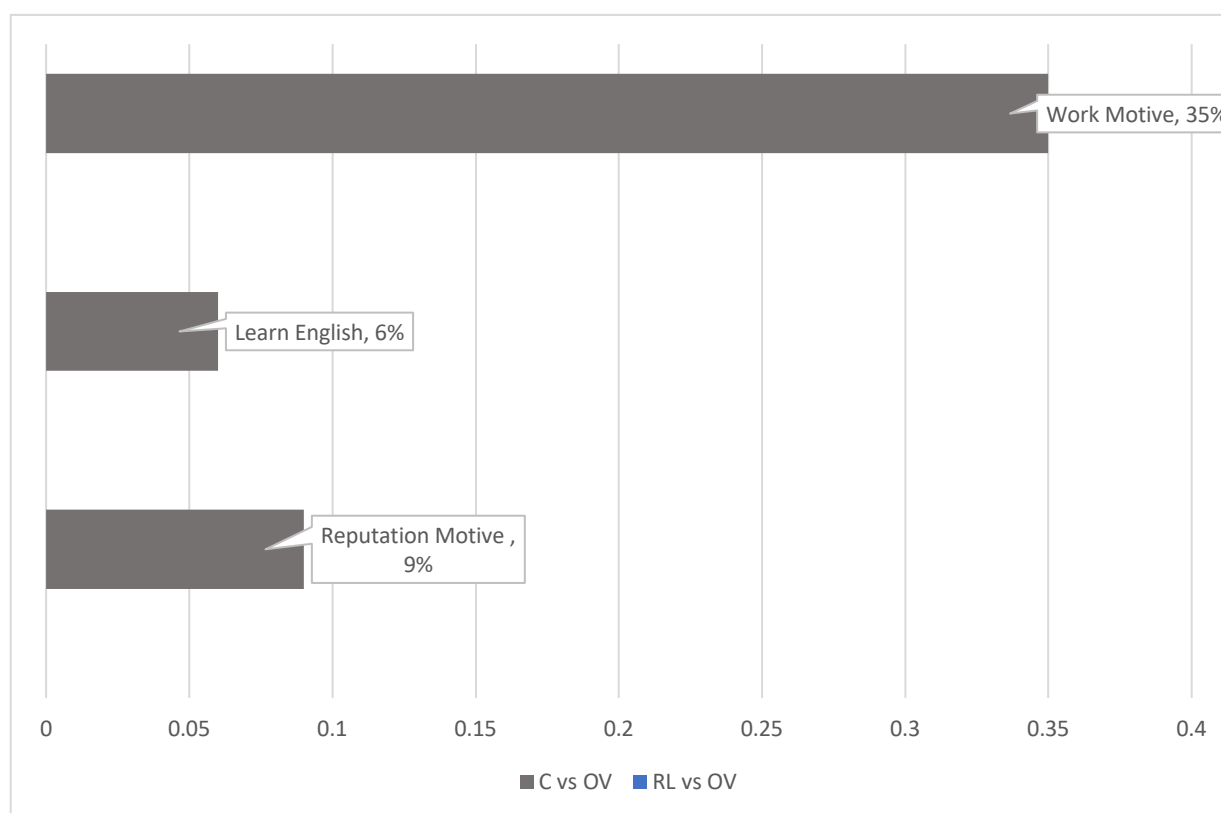
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

RQ5. Do one-time visitors, returning learners, and completers intend to and complete similar percentages of the course?

a) Intention

From Table 34 and Figure 6, we can see that only 31% of returning learners intended to complete the course while 52% of the completers intended to complete the course (see Appendix E for a detailed frequency table). Compared with one-time visitors, students who intended to complete the MOOC were 4% more likely to be returning learners; and students who intended to complete the course were 26% more likely to be completers.

Figure 6.

Probability comparison of intention to complete by three groups of learners
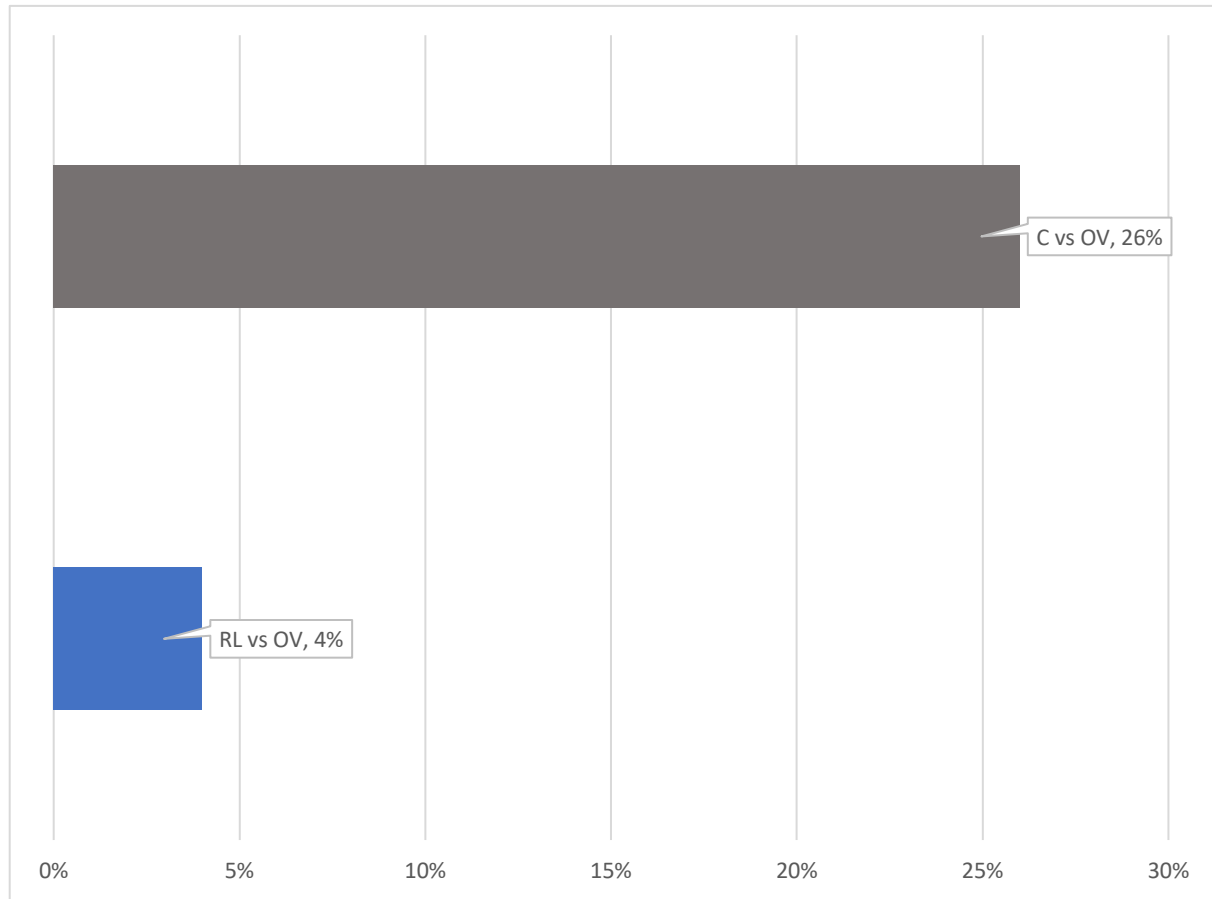
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

b) Actual

From Table 34 and Figure 7, we can see that returning learners watched nine percent of the video content on average while completers watched 47% of videos on average (see Appendix F for a detailed frequency table). Compared with one-time visitors, returning learners watched three percent more video; and completers watched seven percent more videos.

Figure 7.

Probability comparison of actual percentage of video watched by three groups of learners
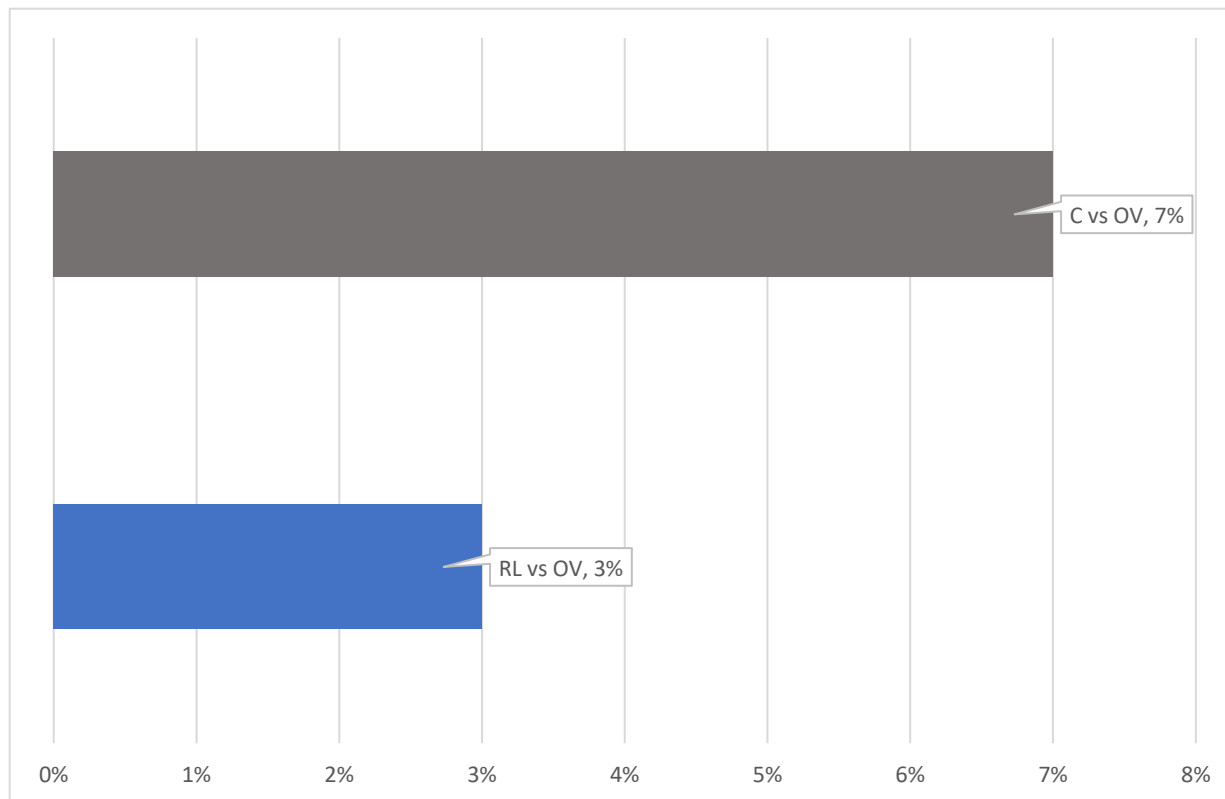
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

RQ6. What are the relationships between the three groups of learners, previous records of taken online course, motives for taking the courses, intention to complete and actual completion?

From Table 34 and Figure 8, we can see that compared with one-time visitor, learners who had a history of taking an online course were three percent more likely to be returning learners; ones who had intention of completion were four percent more likely to be returning learners; and returning learners compared with one-time visitors watched three percent more videos. In addition, compared to one-time visitors, learners who had a history of taking online course were 26% more likely to be completers; learners who indented to complete the course

were 26% more likely to be completers; completers watched seven more percent videos; learners who selected university/professor reputation's as a motive were nine more likely to be completers; learners who selected learning English as one of the motives to enroll were six more likely to be completers; and learners who selected work-related motive 35% more likely to be completers.

Figure 8.

Probabilities comparison of analysis by three groups of learners
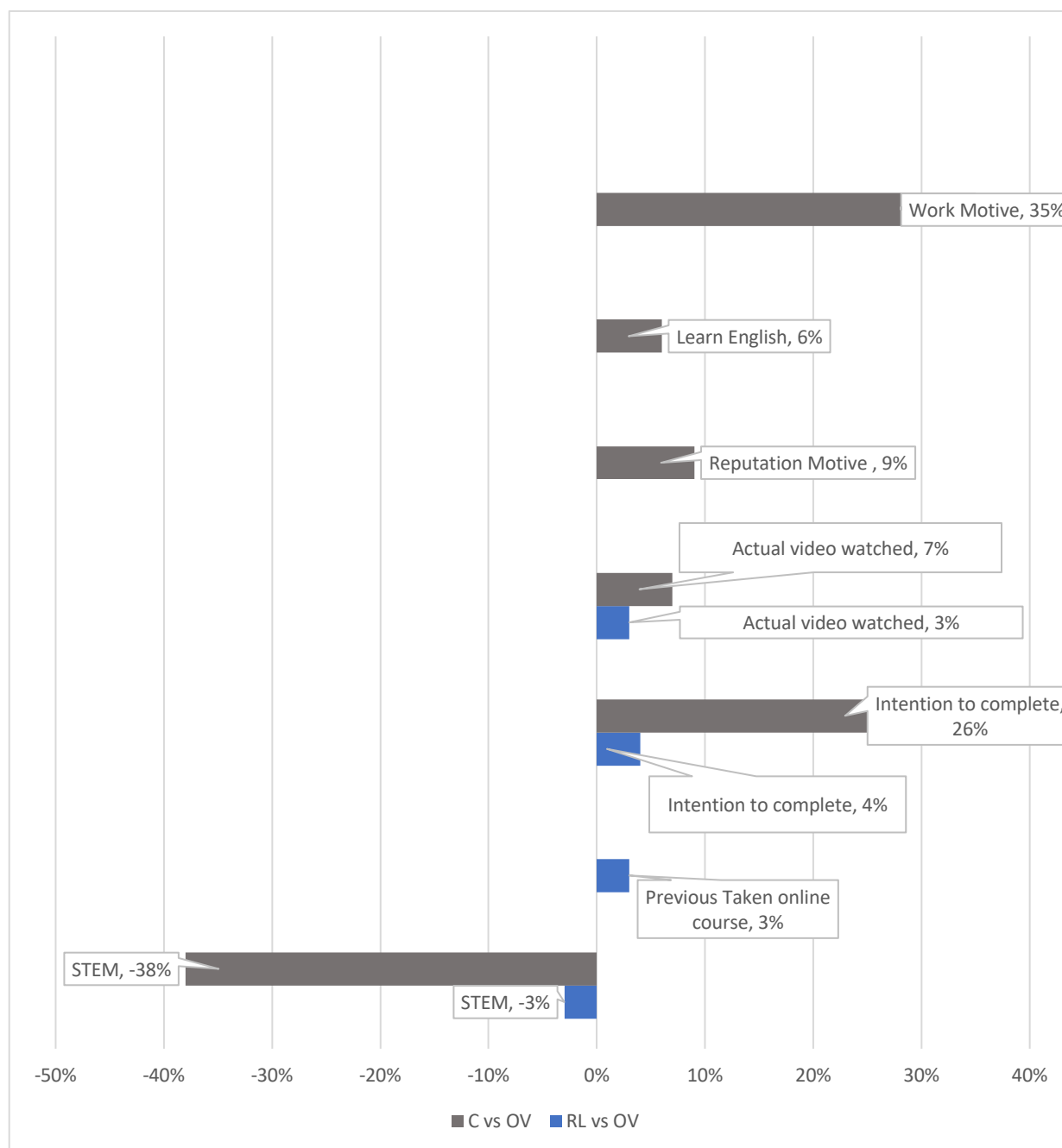
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

RQ7. Are there relationships between the three groups of learners and cultural attributes?

Table 34 includes descriptive analyses of cultural dimensions by the returning learners and completers. From the descriptive analyses we can see that the returning learners and

completers shared a lot of similarities on the cultural dimension index of the countries they were taking the MOOCs from. To start with, 57% of the returning learners and 59% of the completers were from high power distance index-ed country. In addition, 47% of the returning learners and 46% of completers were from collectivistic countries. In terms of masculism versus feminism index, we can see that 66% of returning learners and 65% of completers were from masculine-oriented countries. When dealing with uncertainty, 54% of returning learners and 58% of completers were from countries that are comfortable with uncertainty. In addition, 27% of returning learners and 29% of completers were from long-term oriented countries, and 71% of returning learners and 69% of completers were from restraint-dominated countries.

From Table 34 and Figure 9, we can see that compared with one-time visitors, learners who participated from countries that are more long-term oriented were 3% more likely to be returning learners and 6% more likely to be completers. Learners who participated from countries that are comfortable with uncertainty were 2% more likely to be returning learners and 9% more like to be completers. In addition, learners who participated from countries that are more masculine were 2% more likely to be returning learners.

Figure 9.

Probability comparison of cultural dimensions by three groups of learners
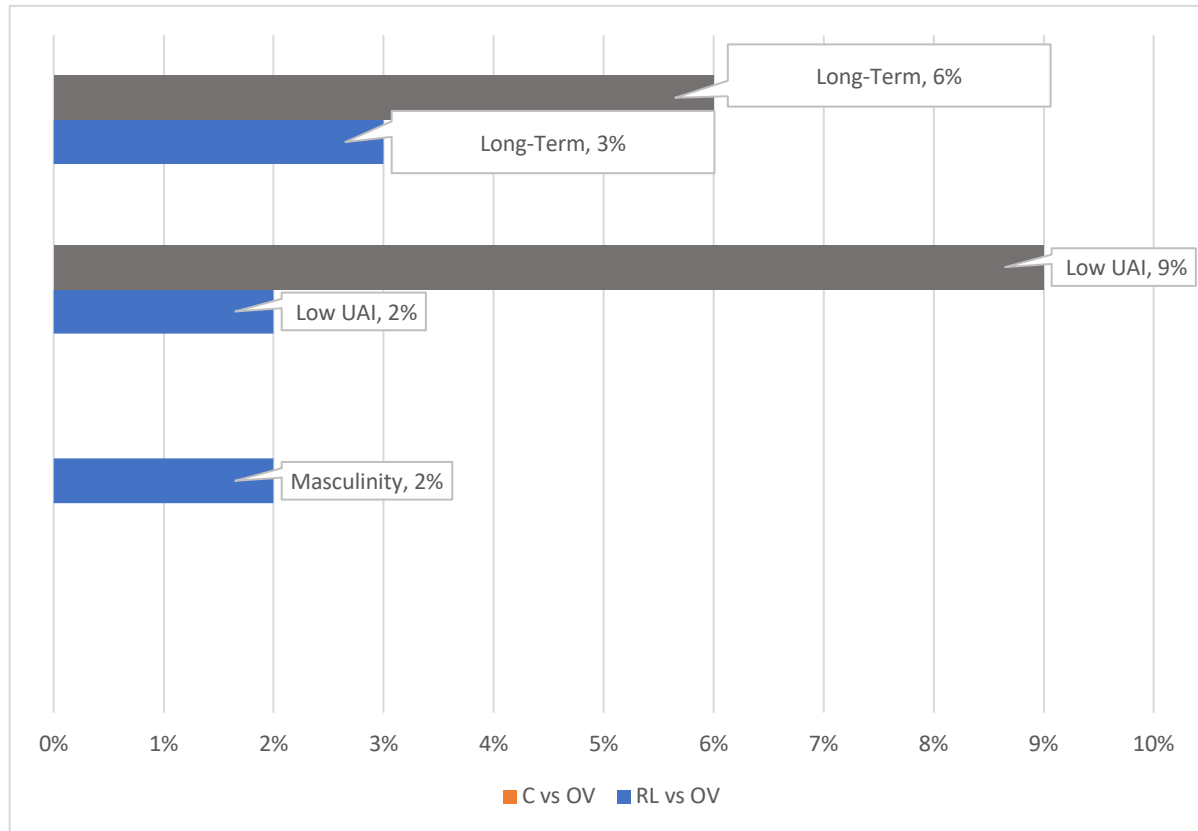
Note: C stands for completers, OV stands for one-time visitors, and RL stands for returning learners

Chapter 5: Discussion

This chapter provides a summary of findings reported in Chapter 4, and how the findings connect with literature review from Chapter 2. This chapter starts by providing an overview of the research findings. Following the implications, this chapter concludes with limitations and future research.

Overview of the Research Findings

This research studied three categories of learners and investigated whether there were significant differences among the groups based on their behavioral data and perceptions. By adopting the concept of returning customers from the field of marketing, the three groups of learners were identified by the number of days they were active within the course, as one-time visitors, returning learners, and completers.

Analyses examined the potential differences among the groups based on their interactions with the video content, attitudinal perceptions, and cultural attributes. When compared with the one-time visitor group, learners who had taken an online course previously and learners who were in non-STEM oriented courses were more likely to be returning learners or completers. Learners who selected their MOOCs based on a reputation related motive, based on learning English as a motive, or based on work-related motives were more likely to be completers.

In addition, this research found that compared with one-time visitors, the learners who intended to complete a higher percentage of the course and the learners who watched a higher percentage of video lectures were more likely to be returning learners or completers.

Finally, the research revealed that some of the differences identified between the three groups may be attributed to cultural factors. Compared with one-time visitors, learners whose countries are more masculine are more likely to be returning learners, while learners whose

countries are more comfortable with uncertainty and are more long-term oriented are more likely to be returning learners or completers.

This research offers insights that may encourage other researchers to broaden their thinking about how the value of MOOCs might be investigated, through a lens that encompasses learners' motivations, personal definitions of completion and cultural attributes. Furthermore, this research also provides preliminary evidence that cultural differences may impact learners' decisions related to enrolling in, returning to, and completing the course. To assist learning designers and administrators in interpreting and applying these findings, the following section will present a discussion of the results, by research question.

RQ1. Are the number of active days different for completers and returning learners?

This research study identified three groups of learners: one-time visitors, returning learners, and completers based on the number of days learners return to the course and the completion status. This research question is intended to understand the difference between returning learners and completers in terms of the number of active days. From the results we can see that, as might be expected, there was a statistically significant difference between returning learners and completers with completers using the course for a higher number of active days.

The descriptive analyses also suggest that both completers and returning learners perceive value in the ten MOOCs analyzed in this study. On average, returning learners stayed active in the course for seven days, ten percent of the returning learners (1,445 learners) stayed active for 14 or more days, and five percent of the returning learners (794 learners) stayed active for 18 or more days. If returning learners did not perceive the course as valuable, they would not stay active and return to the course so frequently.

Based on the analyses, we can see that evaluating MOOCs solely on completion rates can be very misleading when comes to assessing the value of MOOCs from a learner's perspective. From a completion perspective, MOOCs have low completion rates and have been considered as a failure. However, from a learning perspective, the fact that learners keep coming back to MOOCs and stay active for a number of days should be considered as evidence that they are worthwhile to learners who find them valuable. Universities, agencies, and corporations need to understand that completion of a course is not the sole indicator of learning, and that MOOCs are doing good for learners regardless of completion status. For instance, one of the ten MOOCs analyzed in this study is on the topic of Malaria. According to BBC (2011), malaria kills 800,000 people around the world every year, and it affects one in ten across the world population. When universities offer MOOCs like this that are crucial to public health, the value of the course was not just about the 261 learners of the total learners (3,288) who completed the course, but also related to the 14,00 learners used the course, gained knowledge on this subject, and potentially saved countless lives around the world.

RQ2. Are one-time visitors, returning learners, and completers different with regard to whether or not they had previously taken online courses?

The majority of the learners in this study had not take any online course prior to taking the MOOC in which this they had enrolled. Sixty six percent of one-time visitors, 60% of returning learners, and 58% of completers had not previously taken an online course. Compared with one-time visitors, learners who had taken an online course previously were more likely to be returning learners, and there was no statistically significant difference between one-time visitors and completers. This is the first time a study looked into learners' history of taking online course as a potential indicator.

One might expect a statically significant relationship between having previously taken an online course and completion of MOOCs, since previous literature indicated that the ease of use of technologies are key components in technology adoptions (Aharony & Bar-Ilan, 2016). This finding reflected the perspective that maybe other factors are more important in supporting completion than familiarity with technologies.

Similar to online courses, MOOCs have been considered a disruption of the traditional format of higher education, and the concept is still relatively new to the general public. The findings may imply that people who signed up a MOOC as their first online learning experience may not have been comfortable with the digital delivery of MOOCs. Which may have diminished the probability of returning to the course, and increasing the probability that they would be one-time visitors. On the other hand, learners who had taken an online course before may have been more familiar with the format of MOOCs and therefore have been more likely to be returning learners.

One possible explanation for the absence of differences between one-time visitors and completers with regards to the history of online course completion is related to the other possible factors. For instance, perceived usefulness can be a confounding factor to determine whether a learner would enroll in or complete a course (Aharony & Bar-Ilan, 2016; Wu & Chen, 2017).

RQ3. Is the distribution of one-time visitors, returning learners, and completers different in STEM and non-STEM courses?

Descriptive results show more than 80% of the learners in each group of learners were enrolled in non-STEM related courses. Multinomial regression findings from this research question suggest that compared with one-time visitors, learners who took non-STEM oriented courses were more likely to be returning learners or completers, although previous studies

(Evans, Baker, & Dee, 2016; Jiang, Schenke, Eccles, Xu, & Warschauer, 2014) indicated that STEM oriented courses had higher completion rates in comparison with other courses. Three potential factors might serve as possible explanations.

One explanation for this result might be related to the learners' academic readiness for taking STEM related courses. Means, Wang, Young, Peters, & Lynch (2016) indicated that learners' readiness for STEM courses is heavily influenced by students' backgrounds, such as their gender and ethnicity. Although one of the big benefits for MOOCs is that learners can sign up for courses without any prerequisites, it is also one of the big disadvantages: there is no measurement to determine if a learner is ready to take the course. There is a chance that some of the learners were not ready to take the course for which they enrolled. Learners who were not confident in their ability to assimilate the course material might less likely to return to the course, whereas the learners who felt competent with the course content might be more likely to return and complete.

Another explanation of this this result might link to lack of instructional support. Because MOOCs do not provide additional instructional support, such as faculty office hours or teaching assistants, learners have no obvious options when in need of help or support. If learners had questions or got confused, there was no instructional support at there for them, which is likely to have caused them to feel frustrated, and cause them to be less likely to complete the course.

A third explanation of this result might be the low level of learner-to-learner interactions in MOOCs. In a traditional learning setting, classmates sometimes can be a great resource for peer-to-peer support where they can seek help from each other when instructional support is not available. However, in a MOOC setting, learners fail to have a strong peer-to-peer support system. Tawfik et al. (2017) conducted a study to understand the nature and level of learner-

learner interaction in a STEM MOOC. Their findings suggest that learner-learner interaction was limited among learners and decreased over time. Furthermore, all the interactions were heavily dependent on a few highly engaged learners.

There are several implantations for instructional designers and policy makers. To start with, when designing a STEM MOOC, it is important to highlight the prerequisites at the course introduction session to inform learners on what prior knowledge they should learn before taking the MOOC. In addition, instructors can may be able to design or provide links to optional instructional support around difficult aspects of the course, when resources permit. For instance, maybe set up conversations with teaching assistants through online videoconferencing or chats, to support learners who have questions. Last but not least, designers and instructors should consider creating interactive tools or spaces that allows learners to help each other.

RQ4. What are students' motives for taking these courses? Do one-time visitors, returning learners, and completers differ with respect to reasons for taking the course?

This study categorized five different motives based on the survey answers: work/school-related, personal-related, social-related, learning language, and reputation-related. Each category serves as a proxy for perceived value. Among the five categories, nearly every single learner (99.9%) selected at least one personal-related reason in both returning learner group and completer group. Eighty seven percent of returning learners and 96% of completers selected at least one work/school-related reason. Social related motives were not as common as other motives, with only 37% of returning learners and 40% of completers selecteing at least one. Both groups of learners also reported choosing learning English as a motive, with 40% of returning learners and 48% of completers having expressed that as a reason for taking the course.

Surprisingly high percentages, 78% of returning learners and 86% of completers, reported that the reputation of the institution or professors was also a reason for taking the course.

In addition, compared with one-time visitors, completers were more likely to have reported one or more work-related motive, language learning motive, and reputation related motive. However, none of the motives proved to be a factor in distinguishing determine returning learners from one time visitors.

The reputational findings echoed with Zhang, Bonafini, Lockee, Jablokow, & Hu (2019), who found that learners were more likely to choose to take the course for reputation-related reasons, and that learners' MOOC completion increased when the courses were offered by prestigious higher institutions. Another study conducted by (Tawfik et al., 2017) explored factors that increase the rate at which learners complete MOOCs. Based on the survey they sent out to learners at Coursera, edX and Udacity, they found out reputation is one of the strongest factors for learners to complete the MOOC.

Furthermore, this study also suggests that work-related motive is a strong indicator in terms of whether a learner would complete, while social-related motive is not an indicator for learners to complete the course. One possible explain for the absence of a social-related motive is that people might intend to complete the course for work/study purposes; thus, socializing and making friends were not their top priorities.

This study also confirmed that the motivation of learning English might be one of the reasons for international students to complete the course. Whitmer, Schiorring, & James (2014) investigated reasons for students to engage and complete in an English writing MOOC. Based on the study, they found that learners who wanted to learn English were professionals who planned

to increase their career success; high school students who wanted to have a jump start before their college; and college students intended to increase their academic achievements.

There are several implications for instructional designers and different stakeholders in this finding as well. To start with, designers and administrators can have reputational sources to collaborate with them to design and develop the course to gain more tractions. For instance, a school or a university can invite famous professors and/or alumni to be their guest lecturers throughout the course to help them improve their reputations.

In addition, designers and instructors can collaborate with each other to design courses that better serve a group of learners who not only want to enhance their career but also intend to improve their English skill. For instance, a business writing MOOC that focuses on teaching learners how to write English in a business setting can be very helpful to some learners, and designers and instructors might consider designing intensive English learning programs for learners who plan to study in an English-speaking country, but currently lack English proficiency.

RQ5. Do one-time visitors, returning learners, and completers intend to and complete similar percentages of the course?

This study utilized intention to complete as a proxy for learners' commitment. From the analysis we can see that learners who had higher intentions were more likely to be returning learners or completers. In addition, learners who did not intend to complete the course were less likely to be completers. This finding is consistent with previous studies on the subject matter (Bonafini, Chae, Park, & Jablokow, 2017; Koller, Daphne et al., 2013; Konstan, Walker, Brooks, Brown, & Ekstrand, 2014). Bonafini et al. (2017) suggested that learners who had higher intention of completion were more likely to complete the MOOC. As Locke (1982) indicated, a

learner with a higher commitment to the course will be more likely to have better course performance.

In terms of the actual percentage of video watched, from the analysis we can see that learners who watched higher percentages of videos were more likely to be returning learners or completers as well. This finding is consistent with previous studies (Ho et al., 2014; Perna et al., 2014) that learners who had more interactions with the MOOCs were more likely to be completers.

These findings suggest that perhaps those who assess the value of MOOCs should consider separate measures for learners who do not intend to complete the entire course. For instance, if a learner intends to complete 75 percent of a course and does complete the intended 75 percent, then that learner should either be considered as a "completer" or perhaps as a "goal met" category should be created.

In addition, there are several strategies instructional designer and instructors can implement to encourage learners who fail to meet their intended commitment. For instance, instructors can set-up automated check-in email to see if the learner needs any instructional support; designers can also check-in to see if the learners encounter some technical difficulties; and even maybe instructors can create study groups that allow learners to check-in with each other for their progress.

RQ6. What are the relationships between the three groups of learners, active days, previous records of taken MOOCs, motives for taking the courses, intention to complete and actual completion?

This study indicated that when controlling all the relevant variables, what determines a returning learner is based on course category, previous records of taking online course, intention

of completion, and the percent of video watched. Learners who returned more enrolled in a non-STEM MOOC; had a previous record of completing an online course; had intention of completing the MOOC; and watched more videos. This finding indicated that factors like actual behavior of watching more videos, having previously taken an online course, and commitment to completing the MOOC are potential indicators of determining whether a learner is likely to be a returning learner or not.

Similarly, factors likely to indicate a course completer are the course category, the learners' intention to complete, the percent of the actual video watched, having a work-related motive, being motived to learn English, and being motived by the reputation of the institution or professors. In comparison with one-time visitors, completers were more likely to enroll in a Non-STEM course, had a record of completing an online course previously; had the intention to complete the course; watched more videos; chose to take the course based on the reputation, expressed work-related motives, and were motived to learn English by enrolling the course. The findings also suggest that a primary reason why some people complete might be due to the applicability of the course to their current or preferred line of work.

Compared with returning learners, completers had not previously taken online courses and had more motivations of enrolling the course. They were either driven by work, learning English, or by reputation of the institutions or professors. Returning learners, on the other hand, did not have any statistically significant different motives for enrolling in the course. In addition, compared with returning learners, completers were less likely to come from a feminine-oriented society. By nature of the classification characteristics (Hofstede, 2011) masculine-oriented countries tend to focus more on work and care less on family and work-family balance.

Overall, there are several implications for instructional designers and other stakeholders. To begin with, instructional designers should set out different design strategies for learners who are taking STEM and non-STEM MOOCs, since they have different motives for enrolling, different commitment levels, and are from different countries. For instance, if a learner who comes from a short-term oriented country intends to complete a STEM course to enhance career, then the designer should consider build in abundant student-to-student support, should consider designing the course with a shorter length but more intensive, or offer a series of more numerous shorter modular courses covering the same content.

Furthermore, the course marketing and sales team should consider adopting different marketing strategies to reach out to potential learners when they see fit. For instance, the marketing team can consider market a semester-long English language learning course to learners who come from countries that are long-term oriented and are considering learning English for career/school performance enhancement.

In addition, course instructors can increase the reputation of the MOOC through several strategies. For instance, they can invite different experts in the field or famous alumni of the institutions to be guest lecturers and to have engaging dialogues on the subject matter.

RQ7. Are there relationships between the three groups of learners and cultural attributes?

This analysis indicated that returning learners and completers are determined by masculinity, comfortability with uncertainty, and long-term oriented culture. Previous literature (Jiang et al., 2014; Z. Liu et al., 2016) has suggested that certain cultural traits might help learners to complete the course, and this research has confirmed this perspective.

Learners who live in a masculine-oriented culture are more likely to be returning learners. Hofstede (2011) indicated that people in masculine-oriented culture tend to prioritize work over

family. One potential explanation for the findings is that because some learners who took MOOCs are older and some even have a families with children, they might have to balance between family and work. Since MOOCs in general are not required by family nor work, it is easier for them to not complete the course due to obstacles, even though they enrolled in the course and kept returning to it.

In addition, learners who live in a country that is comfortable with uncertainty are more likely to be returning learners. As Hofstede (2011) indicated, people who are comfortable with uncertainty tend to be okay with ambiguity and see the unknown as curiosity. Compared with traditional education, the MOOC concept is a relatively new idea that involves a lot of uncertainty. Therefore, many people may enter their first MOOC uncomfortable with adapting to the new concept.

Learners who are from long-term oriented cultures are more likely to be returning learners or completers. According to Hofstede (2011) people from long-term oriented countries tend to focus on the future events and attribute success to efforts. Because taking MOOCs requires effort and futuristic thinking, the findings of this study confirm Hofstede's conjecture that individuals in long-term oriented cultures are more likely to be focused on their future trajectories.

This finding also has implications for different stakeholders. To start with, to encourage learners from masculine-oriented countries to complete the course (if they intend to), instructional designers can potentially design courses that are short and intensive so that the learners can dedicate a short periods of time to focus on the topic and complete before terminating obstacles might arise . Similar to learners who are in countries that are not comfortable with uncertainties, instructional designers and instructors can design the course in a

very clear and straightforward format, layout the goal and instruction at the beginning of each module and be consistent throughout the course. Last but not least, instructors and instructional designers can design bootcamp-like intensive programs that focus on current job-related skills for learners who are interested in boosting their career trajectory right away.

Implications

There are several implications of this research study. To start with, this research has brought up new terms, one-time visitors and returning learners, based on the number of active days in comparison with completers. Although returning learners and completers are statistically significantly different, the two groups of learners also share some similarities in many ways, and future study should further explore both the similarities and differences between the two groups.

In addition, this study suggested there might be other ways to measure the success of MOOCs other than the singular metric of completion rates. Instead, the value of a MOOC might be explored with the learner's goals, motives, and attitudinal factors in mind, with the understanding that success might be tied to completion.

Furthermore, this study has come up with a potential model that consists of several behavioral components and attitudinal components that could be used to better understand the success of a MOOC from a learner's perspective. Although this study could not get access to the data that could evaluate the model, it provides a foundation for future research.

This study has also suggested that culture plays a significant factor in terms of returning to the course or completing it. The four cultural dimensions that appear to be associated with a returning learner and three cultural dimensions that appear to be associated with a completer imply that learners who come from different countries might have been influenced by the culture of the country and that this influence might affect the probability that they will return to and complete a

MOOC. Different instructional design techniques might be able to help learners from different countries to better achieve their goals of learning.

This study has proposed several implications to be considered by instructional designers, instructors, administrators, and perhaps other stakeholders to better design, develop, evaluate, and market their MOOCs, based on a more complete understanding of different learners' needs. The strategies might help MOOCs to attract more learners who not only want to learn but also intend to succeed with their own learning.

Limitations

This study has several limitations. To start with, due to data limitations, this study only looked at the proxies of two attitudinal elements, perceived value and commitment, out of four attitudinal factors proposed in chapter two. The researcher did not analyze learners' satisfaction and trust due to data restrictions. Future research should address this issue by incorporating the two additional attitudinal dimensions in the study.

In addition, this research only explored behavioral data that related to the number of videos watched. The log data provided by HarvardX did not differentiate different types of interactions occurring within the course. This means, an interaction of opening a new page on the learning platform was recorded as log data with an ID number while watching a video on the learning platform was also recorded as log data with an ID number. Future research should look at multiple dimensions of interaction data to gain a deeper understanding of returning learners.

Moreover, generalizability is limited in this study, as the study only analyzed seven MOOCs in edX platforms. There are different instructional styles of MOOCs within the same MOOC platform or/and on a different MOOC platform, and therefore, this study only represents

findings with these seven courses and one platform and will primarily provide insights for future more comprehensive studies.

Furthermore, the survey data available to this study only represented learners who completed the optional survey, and therefore may not accurately represent the entire population of learners in these courses. As indicated in previous chapters, three courses had to be eliminated due to lack of complete survey information. In addition, even the ones who answered all the survey, might not represent the entire MOOC learner population. Future research should consider utilizing multiple approaches to gather learners' attitudinal information.

In addition, this study did not map the date learners took survey with the date they started the course, and therefore some learners might not have taken the survey until after they started taking the course. Further study should consider limiting this subgroup of learners or separate them for further analyses.

This study employed the Hofstede National Cultural Dimensions as a framework to analyze cultural attributes. The framework tends to generalize people's attributes based on their countries of origin (McSweeney, 2002). This study acknowledges the fact that people from different regions of the same country might have different cultural attributes. In addition, this study also acknowledges that the progress in globalization has made human migration far more accessible than ever. Individuals who are coming from different countries might increasingly share cultural attributes.

Future Research

Future research might consider collecting data from a post-course survey for in-depth analysis. EdX started collecting post-survey data while this research was conducted and started

asking questions directly related to perceived value and commitment. It might prove to be very beneficial to compare the post-survey data with pre-survey data and behavioral data.

In addition, future research might consider collecting attitudinal data related to the four attitudinal dimensions to clarify interpretation of behavioral data and to explore the validity of the model proposed. This research solely analyzed the proxies of two attitudinal dimensions and the interaction data on the percent of video watched in each course; therefore, the results might not be as comprehensive.

Future research should also expand the number of MOOCs being analyzed and acquire MOOCs from different platforms. As we know, different platforms feature different instructors and different instructional design strategies, and future research might be able to provide deeper insights into how to assess the proposed model.

Future research should also consider collecting pre and post survey data firsthand and controlling the survey launch and closure date. As learners who participated in the survey at different stages of their study could be inclined to respond differently, future research might be enhanced by controlling the date of the survey, or investigating the differences exhibited bt learners who took the survey in different stages.

Future research might also consider analyzing whether a learner's motivation shifts after taking the course, and how the motivation might shift throughout the learning journey. Learners might have different motivation before enrolling the course, but may shift their motivation after taking the course.

Future research might also consider adopting different metrics to explore cultural dimensions other than the Hofstede Cultural Dimensions. As globalization has impacted our everyday life, increased diversity is influencing the cultures and people in most countries. Future

research should consider the complexities of the dynamic, evolving, globalized culture and how cultures and individuals are changing.

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Appendix A: Hofstede Cultural Dimensions

Country	pdi	idv	mas	uai	ltowvs	ivr	ctr
Africa East	64	27	41	52	32	40	AFE
Africa West	77	20	46	54	9	78	AFW
Albania	90	20	80	70	61	15	ALB
Algeria	999	999	999	999	26	32	ALG
Andorra	999	999	999	999	999	65	AND
Angola	83	18	20	60	15	83	ANG
Argentina	49	46	56	86	20	62	ARG
Armenia	999	999	999	999	61	999	ARM
Australia	36	90	61	51	21	71	AUL
Austria	11	55	79	70	60	63	AUT
Azerbaijan	999	999	999	999	61	22	AZE
Bangladesh	80	20	55	60	47	20	BAN
Belarus	999	999	999	999	81	15	BLR
Belgium	65	75	54	94	82	57	BEL
Belgium French	67	72	60	93	999	999	BEF
Belgium Netherl	61	78	43	97	999	999	BEN
Bhutan	90	52	32	28	999	999	BHU
Bosnia	999	999	999	999	70	44	BOS
Brazil	69	38	49	76	44	59	BRA
Bulgaria	70	30	40	85	69	16	BUL
Burkina Faso	70	15	50	55	27	18	BUF
Canada	39	80	52	48	36	68	CAN
Canada French	54	73	45	60	999	999	CAF
Cape Verde	75	20	15	40	12	83	AFW
Chile	63	23	28	86	31	68	CHL
China	80	20	66	30	87	24	CHI
Colombia	67	13	64	80	13	83	COL
Comoros	64	27	41	52	32	40	AFE
Costa Rica	35	15	21	86	999	999	COS
Cote D'Ivoire	77	20	46	54	9	78	AFW
Croatia	73	33	40	80	58	33	CRO
Cyprus	999	999	999	999	999	70	CYP
Czech Republic	57	58	57	74	70	29	CZE
Denmark	18	74	16	23	35	70	DEN
Djibouti	64	27	41	52	32	40	AFE
Dominican Republic	65	30	65	45	13	54	DOM
Ecuador	78	8	63	67	999	999	ECA
Egypt	70	25	45	80	7	4	EGY
El Salvador	66	19	40	94	20	89	SAL

Eritrea	64	27	41	52	32	40	AFE
Estonia	40	60	30	60	82	16	EST
Ethiopia	64	27	41	52	32	40	AFE
Fiji	78	14	46	48	999	999	FIJ
Finland	33	63	26	59	38	57	FIN
France	68	71	43	86	63	48	FRA
Georgia	999	999	999	999	38	32	GEO
Germany	35	67	66	65	83	40	GER
Germany East	999	999	999	999	78	34	GEE
Ghana	80	15	40	65	4	72	GHA
Greece	60	35	57	112	45	50	GRE
Guatemala	95	6	37	101	999	999	GUA
Guinea	77	20	46	54	9	78	AFW
Guinea-Bissau	77	20	46	54	9	78	AFW
Honduras	80	20	40	50	999	999	HON
Hong Kong	68	25	57	29	61	17	HOK
Hungary	46	80	88	82	58	31	HUN
Iceland	30	60	10	50	28	67	ICE
India	77	48	56	40	51	26	IND
Indonesia	78	14	46	48	62	38	IDO
Iran	58	41	43	59	14	40	IRA
Iraq	95	30	70	85	25	17	IRQ
Ireland	28	70	68	35	24	65	IRE
Israel	13	54	47	81	38	999	ISR
Italy	50	76	70	75	61	30	ITA
Jamaica	45	39	68	13	999	999	JAM
Japan	54	46	95	92	88	42	JPN
Jordan	70	30	45	65	16	43	JOR
Kenya	64	27	41	52	32	40	AFE
Korea	60	18	39	85	100	29	KOR
Kuwait	90	25	40	80	999	999	KUW
Kyrgyzstan	999	999	999	999	66	39	KYR
Latvia	44	70	9	63	69	13	LAT
Lebanon	75	40	65	50	14	25	LEB
Liberia	77	20	46	54	9	78	AFW
Libya	80	38	52	68	23	34	LIB
Lithuania	42	60	19	65	82	16	LIT
Luxembourg	40	60	50	70	64	56	LUX
Macedonia	999	999	999	999	62	35	MAC
Madagascar	64	27	41	52	32	40	AFE
Malawi	64	27	41	52	32	40	AFE
Malaysia	104	26	50	36	41	57	MAL
Mali	999	999	999	999	20	43	MLI

Malta	56	59	47	96	47	66	MLT
Mauritania	77	20	46	54	9	78	AFW
Mauritius	64	27	41	52	32	40	AFE
Mayotte	64	27	41	52	32	40	AFE
Mexico	81	30	69	82	24	97	MEX
Moldova	999	999	999	999	71	19	MOL
Montenegro	999	999	999	999	75	20	MNG
Morocco	70	46	53	68	14	25	MOR
Mozambique	85	15	38	44	11	80	MOZ
Namibia	65	30	40	45	35	999	NAM
Nepal	65	30	40	40	999	999	NAP
Netherlands	38	80	14	53	67	68	NET
New Zealand	22	79	58	49	33	75	NZL
Niger	77	20	46	54	9	78	AFW
Nigeria	80	30	60	55	13	84	NIG
Norway	31	69	8	50	35	55	NOR
Pakistan	55	14	50	70	50	0	PAK
Panama	95	11	44	86	999	999	PAN
Peru	64	16	42	87	25	46	PER
Philippines	94	32	64	44	27	42	PHI
Poland	68	60	64	93	38	29	POL
Portugal	63	27	31	104	28	33	POR
Puerto Rico	68	27	56	38	19	99	PUE
Qatar	93	25	55	80	999	999	REU
Reunion	64	27	41	52	32	40	AFE
Romania	90	30	42	90	52	20	ROM
Russian Federation	93	39	36	95	81	20	RUS
Rwanda	999	999	999	999	18	37	RWA
São Tomé and Prí	77	20	46	54	9	78	AFW
Saudi Arabia	95	25	60	80	36	52	SAU
Senegal	77	20	46	54	9	78	AFW
Serbia	86	25	43	92	52	28	SER
Seychelles	64	27	41	52	32	40	AFE
Sierra Leone	77	20	46	54	9	78	AFW
Singapore	74	20	48	8	72	46	SIN
Slovakia	100	52	100	51	77	28	SLK
Slovenia	71	27	19	88	49	48	SLV
Somalia	64	27	41	52	32	40	AFE
South Africa	49	65	63	49	34	63	SAF
South Africa white	49	65	83	49	999	999	SAW
South Sudan	64	27	41	52	32	40	AFE
Spain	57	51	42	86	48	44	SPA
Sri Lanka	80	35	10	45	45	999	SRI

Sudan	64	27	41	52	32	40	AFE
Suriname	85	47	37	92	999	999	SUR
Sweden	31	71	5	29	53	78	SWE
Switzerland	34	68	70	58	74	66	SWI
Switzerland French	70	64	58	70	999	999	SWF
Switzerland German	26	69	72	56	999	999	SWG
Syria	80	35	52	60	30	999	SYR
Taiwan	58	17	45	69	93	49	TAI
Tanzania	70	25	40	50	34	38	TAN
Thailand	64	20	34	64	32	45	THA
Togo	77	20	46	54	9	78	AFW
Trinidad and Tobago	47	16	58	55	13	80	TRI
Turkey	66	37	45	85	46	49	TUR
Uganda	999	999	999	999	24	52	UGA
Ukraine	92	25	27	95	86	14	UKR
United Arab Emirate	80	38	53	68	23	34	ARA
United Kingdom	35	89	66	35	51	69	GBR
United States	40	91	62	46	26	68	USA
Uruguay	61	36	38	100	26	53	URU
Venezuela	81	12	73	76	16	100	VEN
Viet Nam	70	20	40	30	57	35	VIE
Zambia	60	35	40	50	30	42	AFE
Zimbabwe	999	999	999	999	15	28	ZIM

Appendix B: Frequency of Returning Learners and Completers on Number of Active Days

N of Days	Frequency	Percent	Valid Percent	Cumulative Percent
		Returning Learners		
2	3032	21.0	21.0	21.0
3	2380	16.5	16.5	37.4
4	1807	12.5	12.5	49.9
5	1352	9.3	9.3	59.2
6	1001	6.9	6.9	66.2
7	848	5.9	5.9	72.0
8	636	4.4	4.4	76.4
9	525	3.6	3.6	80.1
10	418	2.9	2.9	82.9
11	372	2.6	2.6	85.5
12	281	1.9	1.9	87.5
13	258	1.8	1.8	89.2
14	196	1.4	1.4	90.6
15	187	1.3	1.3	91.9
16	150	1.0	1.0	92.9
17	118	.8	.8	93.7
18	112	.8	.8	94.5
19	95	.7	.7	95.2
20	80	.6	.6	95.7
21	71	.5	.5	96.2
22	66	.5	.5	96.7
23	63	.4	.4	97.1
24	52	.4	.4	97.5
25	39	.3	.3	97.7
26	29	.2	.2	97.9
27	39	.3	.3	98.2
28	36	.2	.2	98.5
29	18	.1	.1	98.6
30	25	.2	.2	98.8
31	20	.1	.1	98.9
32	18	.1	.1	99.0
33	10	.1	.1	99.1
34	12	.1	.1	99.2
35	9	.1	.1	99.2
36	4	.0	.0	99.3
37	11	.1	.1	99.3

N of Days	Frequency	Percent	Valid Percent	Cumulative Percent
38	9	.1	.1	99.4
39	4	.0	.0	99.4
40	9	.1	.1	99.5
41	5	.0	.0	99.5
42	6	.0	.0	99.6
43	2	.0	.0	99.6
44	5	.0	.0	99.6
45	3	.0	.0	99.6
46	5	.0	.0	99.7
47	2	.0	.0	99.7
48	4	.0	.0	99.7
49	2	.0	.0	99.7
50	2	.0	.0	99.7
51	4	.0	.0	99.8
52	1	.0	.0	99.8
53	6	.0	.0	99.8
55	2	.0	.0	99.8
56	1	.0	.0	99.8
57	1	.0	.0	99.8
58	2	.0	.0	99.9
60	3	.0	.0	99.9
61	2	.0	.0	99.9
62	2	.0	.0	99.9
63	1	.0	.0	99.9
64	2	.0	.0	99.9
66	1	.0	.0	99.9
67	1	.0	.0	99.9
68	2	.0	.0	100.0
73	1	.0	.0	100.0
78	1	.0	.0	100.0
82	1	.0	.0	100.0
88	1	.0	.0	100.0
90	1	.0	.0	100.0
103	1	.0	.0	100.0
105	1	.0	.0	100.0
Total	14466	100.0	100.0	
		Completers		
1	24	1.1	1.1	1.1
2	35	1.7	1.7	2.8

N of Days	Frequency	Percent	Valid Percent	Cumulative Percent
3	38	1.8	1.8	4.6
4	45	2.1	2.1	6.8
5	51	2.4	2.4	9.2
6	58	2.8	2.8	12.0
7	70	3.3	3.3	15.3
8	70	3.3	3.3	18.6
9	87	4.1	4.1	22.8
10	102	4.9	4.9	27.6
11	98	4.7	4.7	32.3
12	86	4.1	4.1	36.4
13	100	4.8	4.8	41.2
14	82	3.9	3.9	45.1
15	71	3.4	3.4	48.5
16	88	4.2	4.2	52.7
17	79	3.8	3.8	56.4
18	66	3.1	3.1	59.6
19	68	3.2	3.2	62.8
20	71	3.4	3.4	66.2
21	65	3.1	3.1	69.3
22	57	2.7	2.7	72.0
23	44	2.1	2.1	74.1
24	44	2.1	2.1	76.2
25	41	2.0	2.0	78.2
26	38	1.8	1.8	80.0
27	41	2.0	2.0	81.9
28	39	1.9	1.9	83.8
29	37	1.8	1.8	85.6
30	26	1.2	1.2	86.8
31	29	1.4	1.4	88.2
32	32	1.5	1.5	89.7
33	19	.9	.9	90.6
34	16	.8	.8	91.4
35	19	.9	.9	92.3
36	14	.7	.7	92.9
37	10	.5	.5	93.4
38	14	.7	.7	94.1
39	13	.6	.6	94.7
40	12	.6	.6	95.3
41	7	.3	.3	95.6

N of Days	Frequency	Percent	Valid Percent	Cumulative Percent
42	1	.0	.0	95.7
43	5	.2	.2	95.9
44	7	.3	.3	96.2
45	7	.3	.3	96.6
46	4	.2	.2	96.8
47	6	.3	.3	97.0
48	5	.2	.2	97.3
49	5	.2	.2	97.5
50	4	.2	.2	97.7
51	3	.1	.1	97.9
52	3	.1	.1	98.0
53	4	.2	.2	98.2
54	3	.1	.1	98.3
55	4	.2	.2	98.5
56	4	.2	.2	98.7
57	1	.0	.0	98.8
58	6	.3	.3	99.0
59	1	.0	.0	99.1
60	3	.1	.1	99.2
61	2	.1	.1	99.3
64	3	.1	.1	99.5
74	1	.0	.0	99.5
76	1	.0	.0	99.6
78	1	.0	.0	99.6
84	1	.0	.0	99.7
87	1	.0	.0	99.7
92	1	.0	.0	99.8
94	2	.1	.1	99.9
96	1	.0	.0	99.9
98	1	.0	.0	100.0
112	1	.0	.0	100.0
Total	2098	100.0	100.0	

Appendix C: Multinomial Regression

Case Processing Summary

		N	Marginal Percentage
Learners_Group	One-time Visitor	3018	15.4%
	Returning Learner	14466	73.9%
	Completer	2098	10.7%
PRE_MOOCs	Completed	7629	39.0%
	Not Completed	11953	61.0%
STEM_Category	STEM	3075	15.7%
	Non-STEM	16507	84.3%
WorkMotive	Work Motive	17230	88.0%
	No	2352	12.0%
PersonalMotive	Personal Motive	19491	99.5%
	No	91	0.5%
SocialMotive	Social Motive	7247	37.0%
	No	12335	63.0%
LanguageMotive	Learn Language	9213	47.0%
	No	10369	53.0%
ReputationMotive	Reputational Prof/Inst	15406	78.7%
	No	4176	21.3%
Intention_Category	100%	6273	32.0%
	0-99%	13309	68.0%
PDI_Category	High PDI	11220	57.3%
	Low PDI	8362	42.7%
IDV_Category	High IDV	9168	46.8%
	Low IDV	10414	53.2%
MAS_Category	High MAS	12872	65.7%
	Low MAS	6710	34.3%
UAI_Category	High UAI	10606	54.2%
	Low UAI	8976	45.8%
ITOWVS_Category	High ITOWVS	5240	26.8%
	Low ITOWVS	14342	73.2%
IVR_Category	High IVR	13834	70.6%
	Low IVR	5748	29.4%

Valid	19582	100.0%
Missing	0	
Total	19582	
Subpopulation	11003	

Model Fitting Information

	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	23539.582			
Final	14704.865	8834.716	30	.000

Goodness-of-Fit

	Chi-Square	df	Sig.
Pearson	207844286.364	21974	.000
Deviance	12403.261	21974	1.000

Pseudo R-Square

Cox and Snell	.363
Nagelkerke	.467
McFadden	.300

Likelihood Ratio Tests

	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	14704.865	.000	0	.

Percent_watched	22808.784	8103.919	2	.000
PRE_MOOCs	14726.174	21.309	2	.000
STEM_Category	14838.537	133.672	2	.000
WorkMotive	14806.237	101.372	2	.000
PersonalMotive	14705.984	1.119	2	.572
SocialMotive	14705.813	.948	2	.623
LanguageMotive	14713.326	8.461	2	.015
ReputationMotive	14717.814	12.949	2	.002
Intention_Category	14871.984	167.119	2	.000
PDI_Category	14706.076	1.211	2	.546
IDV_Category	14705.572	.707	2	.702
MAS_Category	14712.420	7.555	2	.023
UAI_Category	14718.888	14.023	2	.001
ITOWVS_Category	14717.384	12.519	2	.002
IVR_Category	14709.333	4.468	2	.107

Parameter Estimates

Learners_Group		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B) Lower Bound	Upper Bound
Returning Learner	Intercept	.213	.335	.406	1	.524			
	Percent_watched	.199	.007	772.157	1	.000	1.220	1.203	1.237
	[PRE_MOOCs=0]	.176	.044	15.835	1	.000	1.193	1.094	1.301
	[PRE_MOOCs=1]	0	.	.	0	.	.	.	.
	[STEM_Category=0]	-.192	.056	11.560	1	.001	.826	.739	.922
	[STEM_Category=1]	0	.	.	0	.	.	.	.
	[WorkMotive=0]	.103	.064	2.569	1	.109	1.108	.977	1.257

	B	Std. Error	Wald	df	Sig.	Exp(B)	Lower	Upper
[WorkMotive=1]	0	.	.	0	.	.	.	.
[PersonalMotive=0]	-.111	.305	.132	1	.716	.895	.492	1.628
[PersonalMotive=1]	0	.	.	0	.	.	.	.
[SocialMotive=0]	-.030	.046	.411	1	.522	.971	.886	1.063
[SocialMotive=1]	0	.	.	0	.	.	.	.
[LanguageMotive=0]	.075	.050	2.209	1	.137	1.078	.976	1.190
[LanguageMotive=1]	0	.	.	0	.	.	.	.
[ReputationMotive=0]	.001	.052	.000	1	.983	1.001	.904	1.108
[ReputationMotive=1]	0	.	.	0	.	.	.	.
[Intention_Category=0]	.257	.049	27.393	1	.000	1.294	1.175	1.425
[Intention_Category=1]	0	.	.	0	.	.	.	.
[PDI_Category=0]	-.027	.099	.074	1	.785	.974	.802	1.181
[PDI_Category=1]	0	.	.	0	.	.	.	.
[IDV_Category=0]	-.067	.082	.668	1	.414	.935	.797	1.098
[IDV_Category=1]	0	.	.	0	.	.	.	.
[MAS_Category=0]	.151	.055	7.525	1	.006	1.163	1.044	1.296
[MAS_Category=1]	0	.	.	0	.	.	.	.
[UAI_Category=0]	.165	.056	8.594	1	.003	1.180	1.056	1.318
[UAI_Category=1]	0	.	.	0	.	.	.	.

		B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper
	[ITOWVS_Category=0]	.207	.060	11.901	1	.001	1.230	1.093	1.383
	[ITOWVS_Category=1]	0	.	.	0	.	.	.	.
	[IVR_Category=0]	.114	.066	2.996	1	.083	1.120	.985	1.274
	[IVR_Category=1]	0	.	.	0	.	.	.	.
Completer	Intercept	-5.413	.656	67.992	1	.000			
	Percent_watched	.309	.007	1719.686	1	.000	1.363	1.343	1.383
	[PRE_MOOCs=0]	.006	.082	.006	1	.937	1.007	.856	1.183
	[PRE_MOOCs=1]	0	.	.	0	.	.	.	.
	[STEM_Category=0]	-1.563	.146	115.011	1	.000	.210	.158	.279
	[STEM_Category=1]	0	.	.	0	.	.	.	.
	[WorkMotive=0]	1.451	.162	80.284	1	.000	4.268	3.107	5.862
	[WorkMotive=1]	0	.	.	0	.	.	.	.
	[PersonalMotive=0]	-.654	.603	1.176	1	.278	.520	.159	1.696
	[PersonalMotive=1]	0	.	.	0	.	.	.	.
	[SocialMotive=0]	.025	.085	.085	1	.770	1.025	.868	1.211
	[SocialMotive=1]	0	.	.	0	.	.	.	.
	[LanguageMotive=0]	.268	.092	8.442	1	.004	1.307	1.091	1.566
	[LanguageMotive=1]	0	.	.	0	.	.	.	.
	[ReputationMotive=0]	.352	.111	10.088	1	.001	1.422	1.144	1.767

	B	Std. Error	Wald	df	Sig.	Exp(B)	Lower	Upper
[ReputationMotive=1]	0	.	.	0	.	.	.	.
[Intention_Category=0]	1.062	.084	159.942	1	.000	2.893	2.454	3.410
[Intention_Category=1]	0	.	.	0	.	.	.	.
[PDI_Category=0]	-.181	.174	1.090	1	.296	.834	.593	1.172
[PDI_Category=1]	0	.	.	0	.	.	.	.
[IDV_Category=0]	-.088	.143	.380	1	.538	.915	.691	1.212
[IDV_Category=1]	0	.	.	0	.	.	.	.
[MAS_Category=0]	.155	.102	2.307	1	.129	1.168	.956	1.426
[MAS_Category=1]	0	.	.	0	.	.	.	.
[UAI_Category=0]	.364	.104	12.262	1	.000	1.439	1.174	1.765
[UAI_Category=1]	0	.	.	0	.	.	.	.
[ITOWVS_Category=0]	.268	.113	5.642	1	.018	1.307	1.048	1.631
[ITOWVS_Category=1]	0	.	.	0	.	.	.	.
[IVR_Category=0]	-.023	.124	.034	1	.854	.977	.766	1.246
[IVR_Category=1]	0	.	.	0	.	.	.	.

Appendix D: Frequency of Number of Online Courses Previously Taken by Three Groups of Learners

Groups of Learners	N of online courses taken	Frequency	Percent	Valid Percent	Cumulative Percent
One-time Visitor	0	1989	65.9	65.9	65.9
	1	343	11.4	11.4	77.3
	2	252	8.3	8.3	85.6
	3	154	5.1	5.1	90.7
	4	71	2.4	2.4	93.1
	5	90	3.0	3.0	96.1
	6	29	1.0	1.0	97.0
	7	17	.6	.6	97.6
	8	14	.5	.5	98.0
	9	6	.2	.2	98.2
	10	46	1.5	1.5	99.8
	11	4	.1	.1	99.9
	12	3	.1	.1	100.0
	Total	3018	100.0	100.0	
Returning Learner	0	8741	60.4	60.4	60.4
	1	1961	13.6	13.6	74.0
	2	1329	9.2	9.2	83.2
	3	768	5.3	5.3	88.5
	4	435	3.0	3.0	91.5
	5	481	3.3	3.3	94.8
	6	177	1.2	1.2	96.0
	7	92	.6	.6	96.7
	8	95	.7	.7	97.3
	9	39	.3	.3	97.6
	10	262	1.8	1.8	99.4
	11	11	.1	.1	99.5
	12	75	.5	.5	100.0
	Total	14466	100.0	100.0	
Completer	0	1223	58.3	58.3	58.3
	1	309	14.7	14.7	73.0
	2	192	9.2	9.2	82.2
	3	115	5.5	5.5	87.7
	4	72	3.4	3.4	91.1
	5	70	3.3	3.3	94.4
	6	27	1.3	1.3	95.7

7	8	.4	.4	96.1
8	20	1.0	1.0	97.0
9	4	.2	.2	97.2
10	39	1.9	1.9	99.1
11	8	.4	.4	99.5
12	11	.5	.5	100.0
Total	2098	100.0	100.0	

Appendix E: Frequency of Percent of Intention to Complete by Groups of Learners

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
		One-Time Visitor		
0	7	0.2	0.2	0.2
1	4	0.1	0.1	0.4
9	5	0.2	0.2	0.5
10	4	0.1	0.1	0.7
11	1	0.0	0.0	0.7
13	1	0.0	0.0	0.7
15	1	0.0	0.0	0.8
16	1	0.0	0.0	0.8
19	3	0.1	0.1	0.9
20	11	0.4	0.4	1.3
21	1	0.0	0.0	1.3
25	4	0.1	0.1	1.4
29	4	0.1	0.1	1.6
30	23	0.8	0.8	2.3
31	2	0.1	0.1	2.4
32	2	0.1	0.1	2.5
33	2	0.1	0.1	2.5
34	1	0.0	0.0	2.6
35	2	0.1	0.1	2.6
37	2	0.1	0.1	2.7
38	2	0.1	0.1	2.8
39	2	0.1	0.1	2.8
40	25	0.8	0.8	3.6
41	6	0.2	0.2	3.8
45	7	0.2	0.2	4.1
46	1	0.0	0.0	4.1
47	2	0.1	0.1	4.2
48	4	0.1	0.1	4.3
49	2	0.1	0.1	4.4
50	120	4.0	4.0	8.3
51	34	1.1	1.1	9.5
52	9	0.3	0.3	9.8
53	4	0.1	0.1	9.9
54	2	0.1	0.1	10.0
55	14	0.5	0.5	10.4
56	1	0.0	0.0	10.5
57	2	0.1	0.1	10.5
59	2	0.1	0.1	10.6

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
60	89	2.9	2.9	13.6
61	33	1.1	1.1	14.6
62	19	0.6	0.6	15.3
63	4	0.1	0.1	15.4
64	4	0.1	0.1	15.5
65	39	1.3	1.3	16.8
66	11	0.4	0.4	17.2
67	7	0.2	0.2	17.4
68	6	0.2	0.2	17.6
69	5	0.2	0.2	17.8
70	147	4.9	4.9	22.7
71	76	2.5	2.5	25.2
72	51	1.7	1.7	26.9
73	15	0.5	0.5	27.4
74	11	0.4	0.4	27.7
75	96	3.2	3.2	30.9
76	26	0.9	0.9	31.8
77	13	0.4	0.4	32.2
78	16	0.5	0.5	32.7
79	9	0.3	0.3	33.0
80	193	6.4	6.4	39.4
81	129	4.3	4.3	43.7
82	83	2.8	2.8	46.5
83	15	0.5	0.5	47.0
84	12	0.4	0.4	47.3
85	121	4.0	4.0	51.4
86	26	0.9	0.9	52.2
87	22	0.7	0.7	52.9
88	23	0.8	0.8	53.7
89	15	0.5	0.5	54.2
90	185	6.1	6.1	60.3
91	94	3.1	3.1	63.5
92	75	2.5	2.5	65.9
93	27	0.9	0.9	66.8
94	15	0.5	0.5	67.3
95	117	3.9	3.9	71.2
96	28	0.9	0.9	72.1
97	33	1.1	1.1	73.2
98	28	0.9	0.9	74.2
99	47	1.6	1.6	75.7
100	733	24.3	24.3	100.0

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
Total	3018	100.0	100.0	

Returning Learners

0	35	0.2	0.2	0.2
1	9	0.1	0.1	0.3
2	3	0.0	0.0	0.3
3	1	0.0	0.0	0.3
4	1	0.0	0.0	0.3
5	3	0.0	0.0	0.4
6	1	0.0	0.0	0.4
8	2	0.0	0.0	0.4
9	5	0.0	0.0	0.4
10	11	0.1	0.1	0.5
11	2	0.0	0.0	0.5
14	3	0.0	0.0	0.5
15	1	0.0	0.0	0.5
16	2	0.0	0.0	0.5
17	2	0.0	0.0	0.6
18	2	0.0	0.0	0.6
19	12	0.1	0.1	0.7
20	17	0.1	0.1	0.8
22	1	0.0	0.0	0.8
23	1	0.0	0.0	0.8
24	1	0.0	0.0	0.8
25	8	0.1	0.1	0.9
26	1	0.0	0.0	0.9
27	7	0.0	0.0	0.9
28	4	0.0	0.0	0.9
29	12	0.1	0.1	1.0
30	43	0.3	0.3	1.3
31	13	0.1	0.1	1.4
32	3	0.0	0.0	1.4
33	6	0.0	0.0	1.5
35	5	0.0	0.0	1.5
36	3	0.0	0.0	1.5
37	3	0.0	0.0	1.5
38	6	0.0	0.0	1.6
39	7	0.0	0.0	1.6
40	82	0.6	0.6	2.2
41	11	0.1	0.1	2.3
42	5	0.0	0.0	2.3
43	6	0.0	0.0	2.4

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
44	6	0.0	0.0	2.4
45	21	0.1	0.1	2.5
46	4	0.0	0.0	2.6
47	7	0.0	0.0	2.6
48	7	0.0	0.0	2.7
49	17	0.1	0.1	2.8
50	430	3.0	3.0	5.8
51	103	0.7	0.7	6.5
52	28	0.2	0.2	6.7
53	4	0.0	0.0	6.7
54	10	0.1	0.1	6.8
55	36	0.2	0.2	7.0
56	10	0.1	0.1	7.1
57	5	0.0	0.0	7.1
58	10	0.1	0.1	7.2
59	25	0.2	0.2	7.3
60	332	2.3	2.3	9.6
61	154	1.1	1.1	10.7
62	53	0.4	0.4	11.1
63	28	0.2	0.2	11.3
64	18	0.1	0.1	11.4
65	130	0.9	0.9	12.3
66	32	0.2	0.2	12.5
67	34	0.2	0.2	12.7
68	23	0.2	0.2	12.9
69	20	0.1	0.1	13.0
70	594	4.1	4.1	17.2
71	302	2.1	2.1	19.2
72	146	1.0	1.0	20.2
73	53	0.4	0.4	20.6
74	23	0.2	0.2	20.8
75	392	2.7	2.7	23.5
76	94	0.6	0.6	24.1
77	87	0.6	0.6	24.7
78	52	0.4	0.4	25.1
79	33	0.2	0.2	25.3
80	868	6.0	6.0	31.3
81	474	3.3	3.3	34.6
82	285	2.0	2.0	36.6
83	100	0.7	0.7	37.3
84	66	0.5	0.5	37.7

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
85	569	3.9	3.9	41.6
86	121	0.8	0.8	42.5
87	113	0.8	0.8	43.3
88	81	0.6	0.6	43.8
89	64	0.4	0.4	44.3
90	1076	7.4	7.4	51.7
91	398	2.8	2.8	54.5
92	414	2.9	2.9	57.3
93	164	1.1	1.1	58.5
94	106	0.7	0.7	59.2
95	665	4.6	4.6	63.8
96	137	0.9	0.9	64.7
97	140	1.0	1.0	65.7
98	163	1.1	1.1	66.8
99	345	2.4	2.4	69.2
100	4454	30.8	30.8	100.0
Total	14466	100.0	100.0	
		Completers		
0	7	0.3	0.3	0.3
1	1	0.0	0.0	0.4
20	2	0.1	0.1	0.5
29	1	0.0	0.0	0.5
30	1	0.0	0.0	0.6
31	1	0.0	0.0	0.6
33	1	0.0	0.0	0.7
35	1	0.0	0.0	0.7
40	1	0.0	0.0	0.8
50	17	0.8	0.8	1.6
51	4	0.2	0.2	1.8
52	1	0.0	0.0	1.8
53	2	0.1	0.1	1.9
55	1	0.0	0.0	2.0
57	1	0.0	0.0	2.0
59	1	0.0	0.0	2.0
60	20	1.0	1.0	3.0
61	8	0.4	0.4	3.4
62	1	0.0	0.0	3.4
64	1	0.0	0.0	3.5
65	8	0.4	0.4	3.9
66	2	0.1	0.1	4.0
67	2	0.1	0.1	4.1

Percent	Frequency	Percent	Valid Percent	Cumulative Percent
68	2	0.1	0.1	4.1
69	2	0.1	0.1	4.2
70	30	1.4	1.4	5.7
71	15	0.7	0.7	6.4
72	12	0.6	0.6	7.0
73	6	0.3	0.3	7.2
74	2	0.1	0.1	7.3
75	26	1.2	1.2	8.6
76	7	0.3	0.3	8.9
77	5	0.2	0.2	9.2
78	1	0.0	0.0	9.2
79	1	0.0	0.0	9.2
80	75	3.6	3.6	12.8
81	44	2.1	2.1	14.9
82	29	1.4	1.4	16.3
83	6	0.3	0.3	16.6
84	5	0.2	0.2	16.8
85	53	2.5	2.5	19.4
86	12	0.6	0.6	19.9
87	12	0.6	0.6	20.5
88	10	0.5	0.5	21.0
89	8	0.4	0.4	21.4
90	140	6.7	6.7	28.0
91	64	3.1	3.1	31.1
92	57	2.7	2.7	33.8
93	32	1.5	1.5	35.3
94	10	0.5	0.5	35.8
95	108	5.1	5.1	40.9
96	28	1.3	1.3	42.3
97	40	1.9	1.9	44.2
98	33	1.6	1.6	45.8
99	52	2.5	2.5	48.2
100	1086	51.8	51.8	100.0
Total	2098	100.0	100.0	

Appendix F: Frequency of Percent of Video Completion by Groups of Learners

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
		One-Time Visitor		
1	1318	43.7	43.7	43.7
2	320	10.6	10.6	54.3
3	362	12.0	12.0	66.3
4	346	11.5	11.5	77.7
5	341	11.3	11.3	89.0
6	119	3.9	3.9	93.0
7	36	1.2	1.2	94.2
8	53	1.8	1.8	95.9
9	14	0.5	0.5	96.4
10	12	0.3	0.3	96.8
11	6	0.2	0.2	97.0
12	2	0.1	0.1	97.1
13	18	0.6	0.6	97.6
14	7	0.2	0.2	97.9
15	3	0.1	0.1	98.0
16	2	0.0	0.0	98.0
17	19	0.6	0.6	98.7
18	3	0.0	0.0	98.8
19	2	0.0	0.0	98.8
20	1	0.0	0.0	98.9
21	8	0.3	0.3	99.1
22	2	0.1	0.1	99.2
24	1	0.0	0.0	99.2
25	3	0.1	0.1	99.3
26	1	0.0	0.0	99.4
29	2	0.1	0.1	99.4
32	1	0.0	0.0	99.5
33	2	0.1	0.1	99.5
36	1	0.0	0.0	99.6
38	1	0.0	0.0	99.6
39	1	0.0	0.0	99.6
42	3	0.1	0.1	99.7
45	1	0.0	0.0	99.8
45	1	0.0	0.0	99.8
46	1	0.0	0.0	99.8
47	1	0.0	0.0	99.9
54	1	0.0	0.0	99.9
58	1	0.0	0.0	99.9

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
79	2	0.1	0.1	100.0
Total	3018	100.0	100.0	
		Returning Learners		
0	51	0.4	0.4	0.4
1	2318	16.0	16.0	16.4
2	926	6.4	6.4	22.8
3	1094	7.6	7.6	30.3
4	1406	9.7	9.7	40.1
5	2129	14.7	14.7	54.8
6	1125	7.8	7.8	62.6
7	452	3.1	3.1	65.7
8	677	0.1	0.1	70.4
9	329	6.9	6.9	72.6
10	400	2.8	2.8	75.4
11	181	1.3	1.3	76.6
12	179	1.2	1.2	77.9
13	133	1.4	1.4	79.3
14	467	3.2	3.2	82.6
15	129	0.9	0.9	83.5
16	87	0.6	0.6	84.1
17	257	1.8	1.8	85.8
18	154	1.1	1.1	86.9
19	205	1.4	1.4	88.3
20	66	0.5	0.5	88.8
21	123	0.9	0.9	89.6
22	77	0.4	0.4	90.1
23	165	1.1	1.1	91.3
24	30	0.1	0.1	91.5
25	53	0.4	0.4	91.9
26	68	0.4	0.4	92.3
27	52	0.4	0.4	92.7
28	71	0.5	0.5	93.2
29	18	0.1	0.1	93.4
30	67	0.5	0.5	93.9
31	36	0.2	0.2	94.1
32	77	0.5	0.5	94.7
33	41	0.8	0.8	94.9
34	51	0.4	0.4	95.3
35	43	0.3	0.3	95.6
36	36	0.2	0.2	95.8

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
37	22	0.2	0.2	96.0
38	41	0.2	0.2	96.3
39	31	0.2	0.2	96.5
40	23	0.1	0.1	96.7
41	36	0.2	0.2	96.9
42	28	0.1	0.1	97.1
43	52	0.4	0.4	97.5
44	38	0.2	0.2	97.7
45	86	0.6	0.6	98.3
46	116	0.8	0.8	99.1
47	5	0.0	0.0	99.1
48	14	0.1	0.1	99.2
49	1	0.0	0.0	99.3
50	9	0.1	0.1	99.3
51	3	0.0	0.0	99.3
52	6	0.0	0.0	99.4
53	4	0.0	0.0	99.4
54	5	0.0	0.0	99.4
55	10	0.1	0.1	99.5
56	2	0.0	0.0	99.5
57	1	0.0	0.0	99.5
58	2	0.0	0.0	99.5
59	1	0.0	0.0	99.6
60	1	0.0	0.0	99.6
61	4	0.0	0.0	99.6
62	1	0.0	0.0	99.6
63	3	0.0	0.0	99.6
64	1	0.0	0.0	99.6
65	1	0.0	0.0	99.6
66	2	0.0	0.0	99.6
68	3	0.1	0.1	99.7
69	4	0.0	0.0	99.7
70	1	0.0	0.0	99.7
71	2	0.0	0.0	99.7
72	2	0.0	0.0	99.7
73	2	0.0	0.0	99.7
74	1	0.0	0.0	99.7
75	1	0.0	0.0	99.8
77	1	0.0	0.0	99.8
78	3	0.0	0.0	99.8
79	4	0.0	0.0	99.8

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
80	1	0.0	0.0	99.8
81	3	0.0	0.0	99.8
82	2	0.0	0.0	99.8
83	2	0.0	0.0	99.9
84	2	0.0	0.0	99.9
87	1	0.0	0.0	99.9
88	1	0.0	0.0	99.9
90	1	0.0	0.0	99.9
91	1	0.0	0.0	99.9
92	1	0.0	0.0	99.9
93	1	0.0	0.0	99.9
94	1	0.0	0.0	99.9
96	2	0.0	0.0	99.9
98	4	0.0	0.0	100.0
99	1	0.0	0.0	100.0
100	4	0.0	0.0	100.0
Total	14466	100.0	100.0	
		Completers		
1	20	1.0	1.0	1.0
2	11	0.5	0.5	1.5
3	17	0.8	0.8	2.3
4	13	0.6	0.6	2.9
5	12	0.6	0.6	3.5
6	9	0.3	0.3	3.9
7	16	0.7	0.7	4.7
8	20	1.0	1.0	5.6
9	4	0.1	0.1	5.8
10	10	0.1	0.1	6.3
11	14	0.7	0.7	7.0
12	13	0.5	0.5	7.6
13	12	0.5	0.5	8.2
14	13	0.6	0.6	8.8
15	10	0.4	0.4	9.2
16	10	0.4	0.4	9.7
17	22	1.0	1.0	10.8
18	14	0.7	0.7	11.4
19	15	0.7	0.7	12.2
20	13	0.6	0.6	12.8
21	15	0.7	0.7	13.5
22	12	0.5	0.5	14.1
23	23	1.1	1.1	15.2

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
24	11	0.5	0.5	15.7
25	17	0.8	0.8	16.5
26	23	1.1	1.1	17.6
27	19	0.9	0.9	18.5
28	46	2.2	2.2	20.7
29	22	1.0	1.0	21.7
30	37	1.7	1.7	23.5
31	32	1.5	1.5	25.0
32	61	2.9	2.9	27.9
33	31	1.5	1.5	29.4
34	39	1.9	1.9	31.3
35	29	1.3	1.3	32.7
36	32	1.4	1.4	34.2
37	38	1.8	1.8	36.0
38	21	1.0	1.0	37.0
39	49	2.3	2.3	39.3
40	38	1.8	1.8	41.1
41	100	4.8	4.8	45.9
42	31	1.4	1.4	47.4
43	84	4.0	4.0	51.4
44	69	3.3	3.3	54.7
45	135	6.4	6.4	61.1
46	210	10.0	10.0	71.1
47	3	0.1	0.1	71.3
48	5	0.2	0.2	71.5
49	4	0.1	0.1	71.7
50	3	0.1	0.1	71.8
51	3	0.1	0.1	72.0
52	3	0.1	0.1	72.1
53	8	0.3	0.3	72.5
54	6	0.2	0.2	72.8
55	6	0.3	0.3	73.1
56	4	0.1	0.1	73.3
56	4	0.2	0.2	73.5
57	3	0.0	0.0	73.6
58	13	0.4	0.4	74.2
59	7	0.3	0.3	74.5
60	3	0.1	0.1	74.7
61	3	0.2	0.2	75.0
62	2	0.0	0.0	75.1
63	5	0.1	0.1	75.3

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
64	5	0.2	0.2	75.5
65	5	0.3	0.3	75.8
66	4	0.1	0.1	76.0
67	11	0.4	0.4	76.5
68	9	0.3	0.3	76.9
69	5	0.1	0.1	77.2
70	5	0.2	0.2	77.4
71	6	0.2	0.2	77.7
72	11	0.5	0.5	78.2
73	7	0.3	0.3	78.6
74	11	0.5	0.5	79.1
75	19	0.9	0.9	80.0
76	1	0.0	0.0	80.0
76	5	0.2	0.2	80.3
77	16	0.8	0.8	81.0
78	10	0.5	0.5	81.5
79	35	1.7	1.7	83.2
80	17	0.8	0.8	84.0
81	1	0.0	0.0	84.0
81	3	0.1	0.1	84.2
82	1	0.0	0.0	84.2
82	4	0.2	0.2	84.4
83	12	0.6	0.6	85.0
84	10	0.5	0.5	85.5
85	12	0.5	0.5	86.0
86	8	0.4	0.4	86.4
87	5	0.2	0.2	86.7
88	6	0.3	0.3	86.9
89	8	0.4	0.4	87.3
90	8	0.4	0.4	87.7
91	8	0.4	0.4	88.1
92	18	0.8	0.8	88.9
93	13	0.5	0.5	89.6
94	16	0.8	0.8	90.3
95	20	1.0	1.0	91.3
96	1	0.0	0.0	91.3
96	16	0.8	0.8	92.1
97	2	0.1	0.1	92.2
97	16	0.8	0.8	92.9
98	31	1.5	1.5	94.4
99	43	2.0	2.0	96.5

Percent Watched	Frequency	Percent	Valid Percent	Cumulative Percent
100	74	3.5	3.5	100.0
Total	2098	100.0	100.0	

Appendix G: Multinomial logistic regression analysis of one-time visitors, returning learners, and completers by records of previously completed online courses, STEM vs non-STEM courses, motives, intended percentage of MOOC completion, actual video completion, and cultural attributes (n = 19,582)

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
		Returning Learners vs One-Time Visitors		
Intercept		.213 .335		
Completed Online Courses?				
Yes	.4 (.489)	.176 .044	1.193 [1.094, 1.301]	3% [2%, 3%]
No	.6 (.489)	rc[2]		
In STEM category?				
Yes	.16 (.364)	-.192 .056	.826 [.739, .922]	-3% [-4%, -2%]
No	.84 (.364)	rc		
Work Motive to Enroll?				
Yes	.87 (.334)	.103 .064	ns[3]	
No	.13 (.334)	rc		
Personal Motive to Enroll?				
Yes	0.99 (.069)	-.111 .305	ns	
No	0.01 (.069)	rc		
Social Motive to Enroll?				
Yes	.37 (.482)	-.030 .046	ns	
No	.63 (.482)	rc		

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
Motivated to Learn English?				
Yes	.47 (.499)	.075 .050	ns	
No	.53 (.499)	rc		
Motivated to Enroll by Reputation of Institution or Professors?				
Yes	.78 (.414)	.001 .052	ns	
No	.22 (.414)	rc		
Intend to Complete MOOC?				
Yes	.31 (.462)	.257 .049	1.294 [1.175, 1.425]	4% [3%, 4%]
No	.69 (.462)	rc		
% Videos Watched	9.08 (10.97)	.199 .007	1.22 [1.203, 1.237]	3% [3%, 3%]
Power Distance Index?				
High	.57 (.495)	-.027 .099	ns	
Low	.43 (.495)	rc		
Individualism vs Collectivism?				
Collectivism	.47 (.499)	-.067 .082	ns	
Individualism	.53 (.499)	rc		
Masculinity vs Femininity?				
Masculinity	.66 (.474)	.151 .055	1.163 [1.044, 1.296]	2% [1%, 3%]

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
Femininity	.34 (.474)	rc		
Uncertainty Avoidance Index?				
Avoid low uncertainty	.54 (.498)	.165 .056	1.18 [1.056, 1.318]	2% [2%, 3%]
Avoid high uncertainty	.46 (.498)	rc		
Long-Term vs Short-Term?				
Long-Term	.27 (.443)	.207 .060	1.230 [1.093, 1.383]	3% [2%, 4%]
Short-Term	.72 (.443)	rc		
Indulgence vs Restraint?				
Restraint	.71 (.454)	.114 .066	ns	
Indulgence	.29 (.454)	rc		
Completers vs One-Time Visitors				
Intercept		-5.412 .656		
Completed Online Courses?				
Yes	.42 (.493)	.006 .082	ns	
No	.58 (.493)	rc		
In STEM category?				
Yes	.13 (.332)	-1.563 .146	.21 [.158, .279]	-38% [-41%, -34%]
No	.87 (.332)	rc		
Work Motive to Enroll?				
Yes	.96 (.205)	1.451 .162	4.268 [3.107, 5.862]	35% [31%, 39%]
No	.04 (.205)	rc		

Independent Variable	$\overline{X}$ (*SD*)	*b* SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
Personal Motive to Enroll?				
Yes	0.99 (.058)	-.654 .603	ns	
No	0.01 (.058)	rc		
Social Motive to Enroll?				
Yes	.40 (.49)	.025 .085	ns	
No	.60 (.49)	rc		
Motivated to Learn English?				
Yes	.48 (.5)	.268 .092	1.307 [1.091, 1.566]	6% [4%, 9%]
No	.52 (.5)	rc		
Motivated to Enroll by Reputation of Institution or Professors?				
Yes	.86 (.349)	.352 .111	1.422 [1.144, 1.767]	9% [6%, 11%]
No	.14 (.349)	rc		
Intend to Complete MOOC?				
Yes	.52 (.5)	1.062 .084	2.893 [2.454, 3.410]	26% [24%, 28%]
No	.48 (.5)	rc		
% Videos Watched	47.49 (26.178)	.309 .007	1.363 [1.343, 1.383]	7% [7%, 8%]
Power Distance Index?				
High	.59 (.493)	-.181 .174	ns	
Low	.41 (.493)	rc		

Independent Variable	$\overline{X}$ (SD)	b SE(b)	e^b 95% CI (e^b)	prob > one-time visitors[1] 95% CI (prob)
Individualism vs Collectivism?				
Collectivism	.46 (.499)	-.088 .143	ns	
Individualism	.54 (.499)	rc		
Masculinity vs Femininity?				
Masculinity	.65 (.478)	.155 .102	ns	
Femininity	.35 (.478)	rc		
Uncertainty Avoidance Index?				
Avoid low uncertainty	.58 (.494)	.364 .104	1.439 [1.174, 1.765]	9% [6%, 11%]
Avoid high uncertainty	.42 (.494)	rc		
Long-Term vs Short-Term?				
Long-Term	.29 (.454)	.268 .113	1.307 [1.048, 1.631]	6% [4%, 9%]
Short-Term	.71 (.454)	rc		
Indulgence vs Restraint?				
Restraint	.69 (.463)	-.023 .124	ns	
Indulgence	.31 (.463)	rc		

Source: 7 HarvardX MOOCs

[1] First derivative of the multinomial logistic function at the mean value of the dependent variable from equation 2.10 (Amemiya, 1981).

[2] rc = reference category

[3] ns = No relationship because confidence interval includes zero.

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PUBLICATIONS

Wang, N., Yeh, K.-C., Diehl, W.C., Heiser, R., Gregg, A., Tran, L., & Zhu, C. (In Press). Learning from Doing: Lessons Learned from Designing and Developing an Educational Software within A Heterogeneous Group. *International Journal of Web-Based Learning and Teaching Technologies*

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PRESENTATIONS

Mizumatsu, M., Wang, N. & Heiser, R (2019, Oct) "Introducing SPOT to Cross-cultural Class at a Japanese University: Enriching the Student Learning Experience", Association for Educational Communications and Technology 2017 Annual Conference (AECT), Las Vegas, NV, Oct 21st – 25th, 2019

Wang, N. (2019, June) "Use the Experience of Pioneers to Assess the Value of AI, AR, and VR in Your Organization", the 48th Life Science Trainers and Educators Network Annual Conference, Grapevine, TX (June 5th, 2019)

Wang, N. (2019, April) "A new measurement of Massive Open Online Courses", the America Educational Research Association 2019 Annual Conference, Toronto, Canada, Apr 4th - 9th, 2019