SELF-DETERMINATION THEORY AND MOOC

ENROLLMENT MOTIVATION: VALIDATION OF THE

ONLINE LEARNING ENROLLMENT INTENTIONS

SCALE

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Thank you to my parents, my children, my family, my friends, co-workers, teammates, teachers, coaches, debaters, students, and mentors. My special thanks to anyone who ever invested their time in me by teaching me something. Ian and Sarah, anything is possible if you persist.

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Abstract: Personalized learning tracks within MOOCs remain underdeveloped. Despite MOOCs possessing tremendous potential for personalized learning, little individualization of the MOOC has occurred. Some students look at MOOCs as a textbook, others as a formal course, and others as an opportunity to socialize. Understanding student enrollment needs is critical initial step to helping students get the most out of MOOC. The online learning enrollment intentions scale (OLEI) (Kizilcec & Schneider, 2015) inventories student enrollment motivation in MOOCs. Despite being a short measure of enrollment motivation, the OLEI has not been widely deployed in MOOCs or reported in MOOC literature. This investigation contributes to the validity and reliability evidence of the OLEI by correlating it with mature instruments based on Self-Determination Theory (SDT) and Self-Regulated Learning (SRL). SDT posits that humans are moved by intrinsic, extrinsic, and social motivations. SDT also asserts that the absence of motivation is amotivation. Amotivation is an important construct to study in MOOCs. The overwhelming majority of students sign up for MOOCs and fail to pursue significant learning beyond initial sign-up. Understanding this amotivational state is necessary to developing interventions that motivate MOOC learners to return to the course before they fail to satisfy their learning goals. These four motivational states (intrinsic, extrinsic, social, and amotivational) were investigated using quantitative methods. This study used correlation coefficients to compare associations between the OLEI and instruments built on SDT and SRL. Sixty-eight participants were solicited from active MOOCs on the edX and Coursera platforms. Results support that the OLEI accurately inventories extrinsic and amotivational initial enrollment states. Less support was reported with validity associations for intrinsic or social motivational states and the OLEI. Validity and reliability evidence for the OLEI is reported.

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CHAPTER I

INTRODUCTION

Speaking in 1999 at Comdex, Cisco CEO John Chambers stated, "Education over

the internet is going to be so big it is going to make email usage look like a rounding

error" (Carruth & Carruth, 2013). At the time that Chambers spoke those words, Google

was in its infancy and Netscape was one of the most popular destinations on the internet

(Seymour et al., 2011). While the techno-optimism of Chambers statement has been

moderated by the passage of two decades, the impact of eLearning has been profound.

eLearning grew at a rate of 9.1% from 2018-2019. Annually, eLearning could account for

almost $340 billion globally by 2026 (Syngene Research, 2019).

A recent noteworthy trend in eLearning is the Massively Open Online Course

(MOOC). Since the first iterations of MOOCs in 2008, over 180 million students have

enrolled in at least one (Shah, 2020). As the pandemic of 2020 resulted in widespread

campus closures and lockdowns, enrollment in MOOCs skyrocketed (Shah, 2020).

MOOCs appear to be an enduring and growing component of the global eLearning

landscape. Better understanding of a global educational phenomenon involving more than

200 million learners across every continent is a laudable pursuit. This manuscript is an

attempt to understand more completely MOOCs, human motivation, persistence, the

satisfaction of human needs, and why some educational enrollments prompt more commitment than others. This dissertation reports the results of a quantitative study investigating enrollment motivation in Massively Open Online Courses (MOOCs). In this study, survey research methods are applied to existing measures of student enrollment motivation.

In 2015, two Stanford researchers asked over 100,000 MOOC students why they enrolled in the MOOC. The students reported 13 reasons they enrolled. Those 13 reasons became the Online Enrollment Intentions Scale (OLEI). This study contributes to theoretical and practical understanding of MOOC enrollment motivation. In this investigation, established measures of motivation are used to study the criterion validity of the OLEI by correlating average user response scores on the OLEI to existing inventories of academic motivation. This study contributes to the validity evidence of the OLEI. The OLEI inventories the motivations that prompted online learners to enroll in MOOCs. The need for normed and validated measures of MOOC motivation is pronounced (de Barba et al., 2016). Despite the demonstrated need, the OLEI is not widely used in studies of MOOC motivation.

The instruments used in this study are the OLEI Scale, Academic Motivation Scale (AMS) (Vallerand et al., 1992), the Motivation in Relation to Self-Directed Learning and Collaborative Learning Scale – Collaborative Learning with Information Computer Technology Subscale (Choy et al., 2016), and the Basic Student Needs Survey – Relatedness and Belonging Subscales (Betoret & Artiga, 2011). Chapter One describes educational and societal conditions that gave rise to MOOCs, specifies the problem

statement, explains the significance of the problem, previews the methodology, describes limitations, and provides definitions.

Background

This study contributes to the validity evidence of the Online Learning Enrollment Intention scale, the OLEI. Although the OLEI was originally intended to measure MOOC student enrollment motivation, it is actually designed to measure online learning more broadly. Online learning is an established, durable, and important component of higher education worldwide (Allen & Seaman, 2016). In fact, some educational institutions are predominantly or exclusively digital. Increasingly, online education is accepted by students, faculty, administration, and employers (Gargano & Throop, 2017; Garza, 2017; Wingo et al., 2016). Although some members of the aforementioned groups continue to view online learning with skepticism, many in the academy and the general public state the flexibility, utility, and rigor of online learning make it an attractive option. According to the 2015 Online Report Card by the Babson Research Group (Allen & Seaman, 2016), of the 20.5 million students enrolled in higher education in the United States, more than 28% are taking one or more online courses. The overwhelming majority of online enrollment is at public, comprehensive, non-profit universities (Allen & Seaman, 2016.

The Babson Group is a consortium of faculty researchers from Babson University in Wellesley, Massachusetts. A topic of interest to the Babson group is online education. The aforementioned 2015 report is the last in a series of 13 research reports investigating usage, satisfaction, and perceptions about online education. These reports are loosely organized around the question, "How many students are learning online?" (Allen & Seaman, 2016). The 2015 report (published in 2016) is the group's final report on this

topic. According to this report, online learning is a part of mainstream education in the United States; therefore, the Babson Group chooses to make the 2016 online learning report its last. Online education is so ubiquitous it no longer merits specialized study. Online education is part of higher education. In the parlance of State of the Union addresses, the state of online education enrollment in America is strong and getting stronger every semester.

Online education inherited the legacy of correspondence education (Carr, 2012). Distance education is driven by new technology (Carr, 2012). Online education clears the hurdles of geographic isolation, occupational scheduling difficulties, and familial commitments. Despite the best intentions of educators, these learning arrangements earn varying degrees of acceptance and success. When new more efficient course delivery mechanisms emerge, higher education adopts them fairly quickly (Carr, 2012).

One such paradigm altering technology arrived on the scene in 2008. MOOCs started shifting the distance education paradigm when Stephen Downes and David Comier, Canadian educators teaching a course at Athabasca University, in Alberta, Canada, placed the learning objects for their class, Connectivism and Connected Knowledge 2008 (CCK08), online. The class was offered as an onsite, credit-bearing course to students enrolled at Athabasca. However, the course was free and openly available to anyone who wanted to access the material online (Parry, 2010). Downes and Cormier were surprised when several thousand enthusiasts registered. This first MOOC was functional, but for the next three years, MOOCs remained relatively obscure and unpublicized. Fewer than a dozen courses were taught each year worldwide (Young, 2013).

In 2011, however, the use of MOOCs leapt from distance education obscurity to enter the mainstream zeitgeist when Sebastian Thrun and Peter Norvig at Stanford University's Computer Science Lab offered their Artifical Intelligence CS221 course online for free, in an experimental format (Howarth et al, 2016). More than 160,000 people worldwide signed up for the course (Waldrop, 2013), prompting Thrun to leave Stanford and start a MOOC provider he named Udacity. Just like the credit arrangement at Athabasca University, Stanford students enrolled in an onsite course for credit. Other learners worldwide signed up for the course without the opportunity to earn credit from Stanford. The success of this course also encouraged others to start MOOC providers. Rapid expansion of this innovation led to at least 20 unique MOOC providers. Subsequently, the New York Times declared 2012 "The Year of the MOOC" (Pappano, 2012).

Thrun and Norvig's teaching methods differed greatly from those of Downes and Comier. Simply put, Downes and Comier embraced the instructional methods of practiced discussion facilitators. Meanwhile, Thrun and Norvig envisioned MOOCs as a massive, open, freshman-level course complete with multiple-choice exams and recorded lectures. These educational practices belied significant epistemological differences in teaching and the construction of knowledge. These difference are not unique to MOOCs.

In 2020, more than 180 million students worldwide enrolled in some form of MOOC; more than 950 universities participated at some level in the teaching of at least one MOOC; and at least 16,300 MOOC courses were offered (Shah, 2020). Enrollment in MOOCs grew from a few thousand mostly Canadian students in 2008 to an enrollment of over 110 million by the end of 2019. In fact, according to IPEDS figures, the total United

States undergraduate enrollment for 2014-2015 was 27.39 million students (U.S. Department of Education IPEDS, Accessed April 6, 2017). MOOC enrollments worldwide demonstrate spectacular, exponential rates of growth, producing many areas in need of researcher exploration. In particular, MOOC researchers need succinct items and instruments that have been validated using measures from other educational disciplines (de Barba et al., 2016; Durksen et al., 2016).

Motivation in MOOCs

Motivation is an important construct in the study of academic outcomes. In this regard, the MOOC context differs little from face-to-face instruction. Individuals approach learning opportunities with varying levels of and different types of motivation. One type of motivation prompts students to enroll in MOOCs. Other types of motivation keep students interested in the course matter and persisting to completion. One shortcoming of the current MOOC literature base is that it fails to parse many of the lessons learned from seated studies of educational psychology and educational motivation (de Barba et al., 2016). An abundance of motivational theories, constructs, and studies have created a chaotic and opaque literature base (Cook & Artino, 2016). Despite that complexity, a richer understanding of motivational theory contributes to understanding how motivation fuels or fails to fuel student learning in MOOCs (de Barba et al., 2016).

This dissertation examined the enrollment motivation of MOOC learners. Students sign up for MOOCs in large numbers. Most students are motivated enough to find the course, learn enough about the course, enroll in the course, interact with the homepage once, and then they fail to return to the course (Nazir & Davis, 2015). Indeed, successful course completion is reported to be less than 10 percent (Jordan, 2014).

Finally, only 45% of MOOC enrollees are interested in earning a certificate and completing the course like a traditional college course (Kizilcec & Schneider, 2015).

Nazir and Davis's finding is curious and raises more potential questions. Do students lack motivation when they enroll? Why sign up for a class that one is not sure they will finish? Are students who come to MOOCs with different types of initial motivation stifled by the format, other students, the instructional staff, or the webpage? Why do students sign up and not persist? Why are many students only actions in a MOOC to enroll and never return to class? Do students enroll and/or persist in MOOCs because they are motivated by an intrinsic desire to learn more about a topic? Do students enroll and/or persist in MOOCs because they are motivated by an extrinsic desire to earn a credential, change jobs, or be affiliated with a prestigious school? Do students enroll and/or persist in MOOCs because they are socially motivated to meet new people or practice language skills? Can MOOC course providers identify students who are at a high risk of dropping out, and engage in some type motivation intervention that might fuel that student to continue interacting with the class or to complete the course? Many of the previous questions are extensions, and subsequently beyond the scope, of this study.

If some or most of the questions in the previous paragraph are answered by researchers, then MOOC providers and MOOC instructors will be able to provide personalized learning experiences to learners. Students who are seeking credentialing, social interactions, or immediately applicable information would be grouped with other students who have similar goals. Course facilitators would be deployed to assist differentiated learners with their goals in different educational tracks. The MOOC would not be a one-size-fits-all learning opportunity, but a personalized chance to gather

actionable information and skills and apply the newly acquired knowledge quickly and effectively. A necessary prerequisite to designing individualized, personalized learning is a richer understanding of how initial motivations impact enrollment and all potential interactions that follow.

MOOC students enroll in a course for specific reasons. Those reasons are initial enrollment intentions. Students persist and complete a MOOC using a variety of strategies and motivations. Motivations are either initial, situational, or terminal. Initial motivation is what prompts the action in the first place. Situational motivation describes how motivated learners are while completing a task or a course. Terminal motivation would describe the motivation that a student mustered for a learning opportunity that has concluded.

This dissertation looked at initial enrollment motivations. This dissertation examined the Online Learning Enrollment Intentions Scale (OLEI) (Kizilcec & Schneider, 2015) by correlating it with existing academic motivation measures. The history and specifics of the OLEI are provided in Chapter Two. The OLEI is a scale developed in 2015 using an iterative qualitative process. Over 100,000 learners in online classes were asked 'Why they enrolled in this MOOC'. The OLEI represents 13 possible outcomes to that prompt.

One of the scales correlated with the OLEI in this study is the Academic Motivation Scale (AMS). The AMS is built on Self-Determination Theory. The AMS examines motivation looking for the presence of autonomy, competence, and relatedness. The AMS also measures Amotivation. Amotivation is defined by Deci & Ryan as the 'absence of motivation' (2017).

Self-Determination Theory is a popular theory of human motivation, that was developed by two University of Rochester Psychologists, Deci and Ryan. Self-Determination Theory posits that humans are motivated by intrinsic, extrinsic, and social factors. Self-Determination Theory places conceptual importance on the constructs of autonomy, competence, and relatedness (Deci & Ryan, 2017). Self-Determination Theory attempts to explain why humans initiate and sustain actions. Self-Determination Theory is the theoretical perspective for this examination of enrollment motivation.

This study is the first to examine the OLEI in the context of Self-Determination Theory. Up to this point, previous contributions to the reliability and validity evidence of the OLEI have examined it with items and subscales built on Self-Regulated Learning (SRL) theory of motivation. SRL motivation theory is built on the work of motivation theorists Pintrich and Zimmerman. The SRL theory of motivation is more specific to an academic and learning context. Conceptually, the SRL theory of motivation is appropriate for examining why students persist in behaviors and why students use specific strategies like note-taking, outlining, or re-watching a lecture. SRL considers the construct of 'agency' (internal or external) as fuel that powers a result. The fuel can be intrinsic or extrinsic. In SRL measures, parsing out intrinsic versus extrinsic motivation is difficult unless one is examining item level responses. Results for items or subscales that parse out intrinsic or extrinsic learning motivations were not specifically reported in previous OLEI reliability and validity studies. Results for items or subscales that parse out social motivations have not been adequately applied the OLEI in previous reliability and validity studies. This dissertation applies Self-Determination Theory to the OLEI to examine initial enrollment motivations in MOOCs. Conceptually, previous applications

of SRL items and instruments have painted an incomplete picture of 'why' students enroll. SRL seems more situated for examining 'how' students persisted in a MOOC, more than 'why' they enrolled in the first place. By using measures built on SDT, this study hopes to more comprehensively describe 'why' students enroll and in MOOCs. This study uses SDT theory to explore different specific types of intrinsic, extrinsic, and social motivations to enroll in courses. The study also uses the AMS Amotivation scale to see if any of those three types of motivation are highly correlated with Amotivation, or the absence of motivation. The next section describes the specific problems to be explored.

Problem Statement

If MOOCs are to serve more effectively the diverse needs of their learners, educational researchers and MOOC providers need a richer understanding of what motivates MOOC enrollment. MOOCs offer tremendous potential to personalize learning through the use of learning analytics. Based on students' answers to a few questions, course pathways, content, assessments, and opportunities to engage and connect with others could be tailored to fit the individual needs of MOOC learners. Further, significant variation in the enrollment and persistence motivation of MOOC learners has been observed (Houng & Hew, 2016; Kizilcec & Schneider, 2015; Reich, 2014). Finally, much of the existing MOOC motivation literature digitally tracks MOOC learning behavior, but leaves associated psychological states of motivation under-analyzed or unexamined (Huang & Hew, 2016; Xiong et al., 2015).As such, educational researchers developed the Online Learning Enrollment Intentions Scale (OLEI). The OLEI has been tested for concurrent validity with existing measures of self-regulated learning (Kizilcec et al.,

2017). Although self-regulated learning is a significant portion of overall motivation, other factors impact levels of motivation (Deci & Ryan, 2017). Self-regulated learning describes how learners begin the process of internalizing external motivators (Deci & Ryan, 2000). Self-regulated learning only involves fully integrated extrinsic motivation and does not include many forms of extrinsic motivation that appear to be present in the OLEI. Consequently, the OLEI should be correlated with motivation instruments that examine non-integrated extrinsic motivation and/or social or collaborative learning. The current study potentially lends additional understanding to the literature by contributing to the validity evidence for the OLEI. The correlation of new scales to existing scales is at the heart of construct validity (Cronbach & Meehl, 1955; Kimberlin & Winterstein, 2008; Price et al., 2015).

Research Questions:

RQ1: Do average scores of the OLEI demonstrate criterion validity with the AMS extrinsic motivation subscores?

RQ2: Do the average scores of the OLEI demonstrate criterion validity with the AMS intrinsic motivation subscores?

RQ3: Do the average scores for the OLEI demonstrate criterion validity with social motivation subscores?

RQ4: Do the average scores of the OLEI demonstrate discriminant validity with the AMS amotivation subscores?

Professional Significance

The current study is designed to enhance scholarly understanding of MOOC user enrollment motivation. Administrators, practitioners, and students benefit from greater

understanding of MOOC user enrollment motivation. MOOC student behavior may be more fully explained by applying various valid and reliable instruments to MOOC learners. The current study contributes to the criterion validity evidence of the OLEI. Additional validity analyses of the OLEI are potentially useful contributions to understanding of MOOC enrollment motivation. Although the OLEI has been associated with measures of Self-Regulated Learning, the OLEI has not been correlated with motivation measures built on Deci and Ryan's (2000) Self-Determination Theory. The current study is among the first to administrate the AMS is its entirety and report the results. Self-Determination Theory described in Chapter Two, provides a rich theoretical framework for the evaluation of academic achievement and enrollment motivation. Self-Determination Theory presents a more complete accounting of motivation than other instruments or theories previously associated with the OLEI.

Furthermore, the online learning segment of the higher education sector is growing faster than the education sector as a whole (Schaffhauser, 2017). MOOC enrollment continues to grow at a spectacular pace, although trends suggest that growth is slowing (Allen & Seaman, 2016). In fact, the Covid-19 pandemic resulted in 38.8% increase in MOOC enrollment growth during the months that much of the United States and the world were locked down (March through July of 2020) (Shah, 2020). If MOOCs eventually are to serve as cost-cutting alternatives to traditional, credit-bearing, face-to-face courses for increasingly large swaths of higher education students, considerably more understanding about how learners interact with the educational materials, one another, and their professors is required. MOOCs are being used now by Arizona State's Global Academy to educate Starbucks employees. MOOCs are here. They are growing.

They deserve educational researcher attention. Siemens et al., (2013), writing in the Journal of Online Learning and Teaching, underscores the importance of rigorous studies of MOOCs. Siemens and his team assert that systemic, empiric, and rigorous exploration of MOOCs remains necessary if policy-makers are to make decisions about MOOCs based on evidence rather than hyperbole. This study analyzed the OLEI through MOOC learner self-reports to further contribute to the validity evidence of the OLEI. The current study examines particular components of motivation in MOOCs across a broader spectrum of enrollment intentions.

MOOCs have been labeled as the most disruptive educational innovation in higher education in more than 200 years (Regalado, 2013). Regalado's claim may prove true or MOOCs may fail to live up to their potential to disrupt. MOOCs do continue to expand and grow. If Regalado is correct, educational scholars should likely study MOOCs with increasing levels of precision, rigor, and generalizability with the hope that legislatures, higher education administrators, faculty, and students can make informed decisions about online learning in general, and MOOCs specifically (Siemens, et al., 2013). Efforts to link the OLEI, or more broadly MOOC learning, back to the broader body of knowledge of face-to-face and online academic achievement motivation are valuable.

Although "click data" and learning analytics offer insight into MOOC learning behavior (Kizilcec, Piech, & Schneider, 2013), Kizilcec and Schneider (2015) explore MOOC enrollment motivation with both qualitative and quantitative methods. Subsequently, they developed the Online Learning Enrollment Intention (OLEI) scale. Despite the development of an impressive scale, Kizilcec and Schneider's study (2015)

suffers from some of the same limitations as previous studies by Belanger and Thornton (2013) and the MOOCs@Edinburgh group (2013). These three studies utilized established sections of convenient samples taken from a handful of courses on only one of the major MOOC providers (Coursera). For these reasons, generalizability of these findings remains limited.

Comparatively little is known about MOOC user motivations (Huang & Hew, 2016). The OLEI holds much promise as an instrument. If the OLEI demonstrates criterion validity with the AMS, the OLEI may quickly identify at least six intrinsic and extrinsic motivational constructs in an efficient 14 item measure. This potential total item reduction in evaluating levels and types of motivation would help researchers attempting to standardize items and measures of MOOC enrollment motivation. Without a consistent, quick, unobtrusive measure of initial motivation, subsequent repeated measure studies of motivation are not yet possible. The lack of a widely accepted and validated measures forestalls richer understanding of MOOC motivation interventions and trends. In fact, several MOOC researchers assert that MOOC practitioners need single items or reduced items measuring MOOC motivation (de Barba, et al., 2016; Durksen, et al, 2016).

Hence, the current study seeks to clarify the relationships of constructs like amotivation, extrinsic motivation (to earn a certificate, to get a better job, to do well in another class), intrinsic motivation (to know, to experience, for fun) and social motivation (peer-learning, relatedness, and belonging). This effort seeks to both reduce items and to link the OLEI to existing educational psychology investigations of student learning motivation. The above constructs are part of Deci and Ryan's Self-

Determination Theory (2000). Further, linking the OLEI to additional existing motivation theories is potentially an important step in contributing to the validity evidence of the measure. Such a linkage could help to contextualize potential approaches to increasing MOOC enrollment motivation and to basing potentially MOOC retention efforts on existing motivation theories from psychology and educational psychology. These are existing gaps in the literature that are informed by the current study. At present, the scholarly understanding of motivation in MOOCs is evolving and incomplete (Huang & Hew, 2016). This study contributes to the validity evidence of the OLEI.

Overview of Methodology

This is a correlational study using mature constructs; the epistemology is objectivist (Crotty, 1998). The use of survey instruments involves the post-positivist theoretical perspective (Crestwell, 2003). The study utilizes surveys to measure and categorize MOOC enrollment motivation, attributions, and types of motivation.

Participants were solicited from discussion boards of MOOCs offered by two MOOC providers, Coursera and edX. The participants were students enrolled in ten different types of a MOOCs as described in Chapter Three. The instruments used in the study appear in Table 1.1 below. This study used established survey instruments including: the Online Learning Enrollment Intention Scale (Kizilcec & Schneider, 2015); the Academic Motivation Scale College-28 (Vallerand et al., 1992); the Motivation in Relation to Self-Directed Learning and Collaborative Learning Scale – Collaborative Learning with Information Computer Technology Subscale (Choy et al, 2016); the Basic Student Needs Scale – Relatedness Subscale, and the Basic Student Needs Scale -- Belonging Subscale (Betoret & Artiga, 2011). All methods involved the use of Qualtrics

to collect survey responses, SPSS 26 to analyze data, and correlational procedures to compare user's average scores on scales and subscales. Hypothesized correlations are described in detail in Chapters Two and Three.

Table 1.1

Instruments Used

Scale name:	Scale Abbr.:	Full or partial (name of subscale):	Number of Items:	Author(s):	Year:
Online Learning Enrollment Intentions Scale	OLEI	Full	14	Kizilcec & Schneider	2015
Academic Motivation Scale	AMS	Full	28	Vallerand, Pelletier, Blais, Brière, Senécal, & Vallières	1992
Motivation Self-Directed Learning and Collaborative Learning	MSDLCL-CL w/ICT	Partial (CL w/ICT)	4	Choy, Deng, Chai, Koh, & Tsai	2016
Basic Student Needs Scale	BSNS-r	Partial (Relatedness subscale)	4	Betoret & Artiga	2011
Basic Student Needs Scale	BSNS	Partial (relatedness subscale)	5	Betoret & Artiga	2011
Demographic Questions	DEMO	DEMO	9	N/A	N/A

Limitations

Survey research is susceptible to response bias. Students were not required to participate in the study; participants volunteered. Because the participants were volunteers, it is possible that they possessed higher levels of motivation generally than students who did not self-select to enroll in a MOOC or who do not self-select to participate in additional tasks (e.g. participating in the survey). Despite this potential

increased risk of Type I error, educational research methodologist assert that response bias is actually limited in an online context in other ways because the participants are more honest (Denscombe, 2006; Keller & Lee, 2003).

Although the response bias introduced to the study from self-selection is impossible to reduce, an additional potential source of response bias occurs as MOOC students disengage from the course. Because many MOOC participants enroll in the course and then have no additional interaction with the class (Clow, 2013), the motivational response bias compounds as the course progresses. To limit this secondary and compounding response bias, the link to the survey was posted to the discussion board during the first three days in which the course is available. Hence, the most representative and complete potential sample is assembled while the largest number of students remain active in the course. This procedure theoretically reduces response bias related to course attrition and amotivation. In this way, the attrition component of MOOC motivation response bias is limited.

Definitions

Academic Motivation

Academic motivation involves self-regulated pursuit of academic goals, including the desire to satisfy cognitive needs in an academic domain. Students demonstrate academic motivation by engaging in learning behaviors. Academic motivation is a subset of motivation. Academic motivation is thought to be critical to academic success or efficacy.

Academic Motivation Scale (AMS)

A psychological instrument that measures intrinsic, extrinsic, and amotivation, this 28-item self-report is a popular survey that has been used in scores of academic studies since its release in the 1980s. The Academic Motivation Scale was developed by a team of French researchers, led by Robert Vallerand. The AMS evaluates seven different motivation types. Primarily, the AMS categorizes motivation as intrinsic or extrinsic.

Amotivation

A primary motivation construct of SDT. Amotivation is the absence of motivation. Students who demonstrate amotivation are not moved to act. In the present study, amotivation is operationalized by the AMS Amotivation subscale.

Basic Student Needs Scale

Building on the Self Determination Theory work of Deci and Ryan (2000), the BSNS measures students' perceptions of satisfaction of the three basic needs that undergird the SDT: autonomy, competence, and relatedness (Betoret & Artiga, 2011). The BSNS also adds an additional construct of belonging that measures students' perception of fitting into the organizational structure of a class or a community.

Binary Variable

These are specific types of categorical variables. Binary variables include forced choices usually of "yes" or "no". The OLEI uses "applies" or "does not apply" options.

Connectivism

Connectivism is a learning theory, sometimes called a learning theory for the digital age, developed by George Siemens and Stephen Downes (Siemens, 2004).

Extending the theories of behaviorism, cognitivism, and constructivism, connectivism assumes a technology-rich world. Connectivism suggests that learners gain knowledge by making connections with appropriate material, other learners, and the world in general. Furthermore, learning connections are created in neurological, biological, conceptual, and social contexts (Kesim & Altinpulluk, 2015). Finally, connectivists emphasize that learning is not limited to top-down transmission of information or knowledge, but rather learning happens when the learner transforms and transfers knowledge through interaction with others, especially in web-based, networked, digital environments.

cMOOCs

The "c" in front of "MOOC" is an additional modifier; the "c" stands for connectivist. Connectivist MOOCs were the original MOOCs offered at Athabasca University. These MOOCs emphasize creativity and connection; cMOOCs are predicated on the learning theory of connectivism. The instructional philosophy of this type of MOOC resembles discussion facilitation.

Correlation

A statistical measure of association of two scale variables measured at the interval or ratio level. Correlations report the co-relations or associations of the two variables.

Coursera

Coursera is a for-profit xMOOC (definition below) service provider founded by Daphne Koller and Andrew Ng in 2012. Coursera originated at Stanford University.

Criterion Validity

This type of validity is concerned with how well scores on the new measure correlate with other measures of the same construct or very similar underlying constructs

that theoretically should be related. The existing measure being correlated to the newer measure is considered a criterion measure. When criterion validity is evaluated synchronously it is classified as a concurrent validity investigation. When criterion validity is evaluated asynchronously, the investigation is considered to evaluate predictive validity.

Concurrent Validity

This type of criterion validity is concerned with the temporal sequence of the comparison to other measures. Does the comparison happen simultaneously, or nearly so, or is the criterion measure administered after the passage of time? If the comparison is simultaneous then the validity investigation is concurrent. If it is time delayed it is predictive.

Data Mining

"Data mining is a use of technology to discover useful knowledge from one or more large databases, data warehouses, and data sets.

Discriminant Validity

A type of validity measured through correlation. Whereas criterion validity emphasizes associations between a newer instrument and an older instrument measuring the same constructs, discriminant validity correlates the variables assuming that they will are not be correlated because they measure different constructs. In the current study, Research Question Four is a discriminant validity question. Are measures of motivation unrelated or unassociated with the AMS Amotivation scale?

edX

edX is a not-for-profit xMOOC service provider. edX is a collaborative effort between MIT and Harvard that grew from the MIT Open Courseware Project. edX is one of the two MOOC providers where the URL to the study was posted.

Extrinsic Motivation

A primary motivational construct of SDT. Extrinsic motivation moves a person to action to avoid a negative consequence or to receive a positive reward. In the present study, extrinsic motivation is operationalized by three AMS subscales: Identified Regulation, Introjected Regulation, and External Regulation.

Intrinsic Motivation

A primary motivational construct of SDT. Intrinsic motivation moves a person to action because the activity is fun, enjoyable, or a desirable experience. In the present study, intrinsic motivation is operationalized by three AMS subscales: To Know, To Accomplish, and To Experience.

Learning Analytics

Learning analytics describes the utilization of user click data to describe, predict, and/or evaluate learning behaviors in online learning environments such as Learning Management Systems and MOOCs. MOOCs track and record every mouse movement, hover, click, and keystroke of MOOC users. These data are used to illuminate the ways students in online learning environments learn. Learning analytics focus on detecting micro-patterns of user behavior and interaction within the learning environment. Researchers use learning analytics to track the time students spend doing homework, watching lecture videos, engaging in discussion boards, completing lab assignments,

consulting the textbook, and other course resources. Learning analytics allow researchers to study high-performing students and map the activities and behaviors that most accurately predict success.

Learning Management Systems (LMS)

Learning Management Systems are complex web-based computer applications that operate on secure servers and distribute educational content such as quizzes, discussion boards, recorded lectures, and assignments to learners who have internet access. Examples with which readers may be familiar include Angel, Blackboard, Canvas, Desire 2 Learn, Moodle, and Sakai.

MOOC

The term "MOOC" stands for Massively Open Online Course. MOOCs are web-based educational environments providing learning opportunities from elite universities and instructors through interaction with multimedia learning objects, such as video, animation, presentations, discussion boards, writing and other assignments. These courses are typically offered free of charge and without pre-requisite.

Motivation

Cook and Artino (2016) reviewed educational psychology literature and determined that four broad constructs were at work in every theory of human motivation: competence, value, attributions, and cognition. All motivation theories, including SDT, use these four larger constructs.

Motivation in Relation to Self-Directed Learning and Collaborative Learning Scale

The MSDLCL was developed in response to the criticism that the Motivated Strategies for Learning Questionnaire (MSLQ) did not translate well into modern online

learning contexts. The MSLQ was developed by McKeachie, Pintrich, Lin, & Smith (1986). Subsequently, the MSDLCL updated the MSLQ to assume internet computer technology. The MSDLCL is a 28-item measure using a four-point Likert scale. The MSDLCL can be used as a unified whole or as subscales. The MSDLCL has seven subscales with four items each. The seven scales on the MSDLCL are task value, self-efficacy, extrinsic goals, self-directed learning, self-directed learning with technology, collaborative learning, and collaborative learning with technology. Two of the scales exclusively assess self-directed learning and collaborative learning with or without technology. The MSDLCL is a self-report data collection instrument designed to assess college students' motivation. Based on the MSLQ, the MSDLCL was produced in 2016 and is freely available for educational use with attribution.

Online Enrollment Intentions

Online enrollment intentions are the reasons why students are motivated to enroll in online courses.

Online Learning Enrollment Intentions Scale (OLEI)

The OLEI was developed by two Stanford researchers (Kizilcec & Schneider, 2015). This categorical scale asks subjects to respond "applies" or "does not apply" to a list of 13 common MOOC enrollment intentions along with an open-ended item. The 13 items listed in the OLEI are: general interest in the topic, relevance to job, relevance to school or degree program, relevance to academic research, for personal growth and enrichment, for career change, for fun and challenge, to meet new people, to experience an online course, to earn a certificate/statement of accomplishment, course offered by

prestigious university/professor, to take with colleagues/friends, and to improve English skills. These 13 closed items are complimented by one open-ended item.

Self-Determination Theory (SDT)

This theory of human motivation was developed by University of Rochester psychologists Deci and Ryan. SDT posits that motivation is a unitary construct and is activated by the drive to satisfy basic human needs of autonomy, competence, and relatedness. SDT has been used in thousands of human motivation studies and hundreds of dissertations. Recent meta-analyses have demonstrated SDT's utility in a number of contexts. SDT posits that motivation exists along a continuum with amotivation representing the least motivated state, extrinsic motivation demonstrating the next level of motivation, and intrinsic motivation representing the highest motivational state.

Social Motivation

This is a type of motivation to learn. Social motivation is any type of motivation that moves a person to action because the activity is socially stimulating. In the present study, this construct is operationalized by the MSDLCL w/ICT, BSNS-B, and BSNS-R.

Validity

Validity is concerned with the question, "Does the instrument measure what it claims to measure?" Specific forms of validity are often measured through correlation. This study is concerned with criterion validity, concurrent validity, and discriminant validity.

Summary

This chapter introduced the subject of enrollment motivation in MOOCs and asserted that educational researchers should learn significantly more about MOOC

enrollment motivation. An existing gap within the literature identified by this study is a lack of criterion validity studies correlating the OLEI with existing measures of academic motivation from educational psychology. This study contributes to the validity evidence of the OLEI by correlating the OLEI with multiple scales and subscales measuring different types of enrollment motivation demonstrated by MOOC learners. Chapter Two is a review of literature related to Self-Determination Theory, MOOC motivations, and the scales and procedures used in correlating the variables. Chapter Three reports the methodology of the study. Chapter Four reports the results of the associations. Chapter Five discusses the results and situates the contributions to research, theory and practice made by this investigation.

CHAPTER II

LITERATURE REVIEW

What motivates people to sign-up for a MOOC? Chapter Two reviews the

literature relevant to MOOC enrollment motivation. Kizilcec & Schneider's (2015)

Online Learning Enrollment Intention Scale (OLEI) is an instrument designed to

inventory and report the reasons moving students to enroll in MOOCs. This study

recognizes the need for short measures that can be easily integrated into MOOCs without

significant disruption to learning activities (Durksen, et al., 2016; Kizilcec & Schneider,

2015; de Barba, et al., 2016). The OLEI may usefully contribute to that niche, but

additional validity evidence is required to ensure instructors and educational researchers

have confidence in the OLEI. The current study contributes to the OLEI validity

evidence.

First, the general search process is described. Second, because motivation to learn

is central to this study, the four overarching theoretical constructs of human motivation to

learn are explored. Third, this study is partially built on Deci and Ryan's (2000) Self-

Determination Theory (SDT) of learning motivation. SDT literature and six sub-theories

that support SDT are summarized. Fourth, because several researchers make direct

connections between SDT and online learning broadly, and MOOCs specifically, these studies and literature are excavated. Fifth, the existing empiric studies of MOOCs and enrollment-related motivation are reviewed. Sixth, because this study is designed to contribute to the validity evidence of the OLEI Scale, the history and previous studies using the OLEI are examined. Seventh, to establish concurrent validity other instruments must be administered with the OLEI synchronously. These measures are introduced and overviewed. Eighth, this study investigates four specific research questions related to the OLEI's validity evidence. These four research questions are situated within the existing OLEI literature. Ninth, validity evidence as a contribution to behavioral science inquiry in general is summarized. Applications to the present study are made. Before the literature is reviewed or interrogated, an explanation of the research process is warranted.

Search process

The literature review search process for the current study used database collections of academic research. The four databases chosen represent a cross-section of disciplines. One of the first literature reviews summarizing MOOC literature was conducted by Ebben and Murphy (2014), who described the MOOC literature base as diverse (Ebben & Murphy, 2014). Ebben and Murphy chose four somewhat unrelated databases in their seminal literature review of MOOC discourse: Proquest, EbscoHost, Open Journals, and Science Direct. This literature review used the same four databases.

Peer-reviewed articles about MOOCs have been published in most fields; however, computer science, distance education, educational research, and policy analysis are well represented. The corpus of literature addressing MOOC motivations remains "thin" (Xiong, et al., 2015, p. 25). Despite the unsettled nature of the literature base, some

authors have described MOOC scholarships as "rapidly expanding" (Terras & Ramsay, 2015, p. 483). The articles in Science Direct demonstrated an exponential increase in research studies examining MOOC motivation.

The terms "MOOC" and "enrollment motivation" were entered into ERIC ProQuest within Oklahoma State University's Big Orange Search System. Approximately one dozen Boolean searches were conducted using both ERIC recognized descriptors and other keywords. All four databases were searched using a variety of search terms, search descriptors, open-ending truncation operators, and open date operators. Initial returns were recorded in a search journal document. The term *MOOC* was searched for anywhere within the article. Terms like "enrollment", "motivation", and "intention" were searched for in the Title Field. At least two of these databases do not have Title Field functions; hence, a large number of articles were generated. These articles were visually examined for relevance. The largest results in these databases often replicated results found elsewhere or literature that had already been evaluated. Attachment A contains additional clarification regarding the literature gathering methods for this research study.

The database search results were scanned for relevance. Potentially relevant results were selected. The abstracts of potentially relevant articles were read. Articles determined to be germane to the literature review were saved electronically, printed, and filed. The last search of this literature using this method was completed on September 15, 2018.

Next, after a relevant article was discovered, the references cited in that article were scanned for relevance. This method of reference list snowballing was effective at

identifying numerous additional pieces of literature reviewed for this study. This method broadened the base of literature substantially.

Finally, this corpus of literature was digested. Each article was printed, read initially, and highlighted for relevant contributions. Each relevant contribution was numbered and then summarized—written notes were made on the front and back covers of the file folder. Scholarly and/or research articles about MOOC motivation were abstracted for the current study. Scores of other articles, book chapters, and editorial comments about MOOCs, self-determination theory, correlation, and validity were given a similar treatment. This section described the literature review search process steps for this study. The next section describes motivation theories.

Motivation Theories

Intellectuals from Plato to Pavlov and Socrates to Skinner, have sought to explain why people think and act the way they do. More recent efforts to explain human motivation were led by psychologists Bandura, Pintrich, Deci, and Ryan. The fabric of scholarly understanding of human motivation was woven from the strands of several dozens of motivation theories and ruminations that directly or indirectly affect this study. Academic motivation has prompted multitudes of studies and manuscripts; indeed, few topics have generated more interest than academic motivation to learn (McKeatchie et al., 1989; Deci & Ryan, 2000; Cook & Artino, 2016).

Cook and Artino's (2016) summary of academic motivation was useful in the conceptualization of variables for this study. Cook and Artino's (2016) concise treatment is an appropriate entry point into academic motivation. One of the first recorded

observations of the importance of motivation dates back to Plato (Pintrich, 1989). Despite its long history, many mysteries persist with regard to human motivation.

Motivation is typically situated in the field of psychology. However, academic motivation investigations frequently originate from education, educational psychology, educational technology, business, or the liberal arts. Consequently, the literature base can be confusing, contradictory and opaque (Cook & Artino, 2016). Indeed, thousands of investigations and manuscripts promulgated in unrelated journals and academic quotation circles would create confusion in any discipline. A recommended entry point into this potentially confusing corpus of literature might be to inquire, "what are some generalized theories of motivation which might guide an investigation of motivation to learn?" This question is not as straight forward as it seems. There are dozens of theories that potentially impact academic motivation (Cook & Artino, 2016). Describing all of them is beyond the scope of this literature review. However, to situate properly the current study in the extant universe of motivation theories, Deci and Ryan's (2000) Self-Determination Theory (SDT) is reviewed.

However, before SDT is decomposed, a broader discussion of recurring themes present across multiple learning theories is appropriate. Despite an overlap of terminology or factors, four broad overarching themes appear to be central tenets of several motivation to learn theories (Cook & Artino, 2016). These four recurring themes are: competence, value, attribution, and cognition. Cook and Artino's (2016) four themes are the conceptual framework for academic motivation in the current study.

Motivation Conceptual Framework

Motivation is defined as, "the process whereby goal-directed activities are instigated and sustained" (Cook & Artino, 2016, p. 998). This definition conveys that motivation is a 'process', which is important because SDT assumes that actions can bolster or batter motivation. This definition conveys that motivation is a result of 'goal directed behavior'. According to Pintrich, (1989), all motivation theories posit that goals, purposes, or intentions guide motivated human behavior. Motivation theories assume that people initiate and persist at behaviors because they believe those behaviors lead to the accomplishment of goals or lead to desirable outcomes (Deci & Ryan, 2000). Finally, this definition supposes that the goal-directed behavior is either initiated or continued. As researchers attempt to parse out the complicated ways in which MOOC design, social interaction, and teaching methods impact learner motivation, a better understanding of how and why MOOC learning behaviors are initiated or sustained is vital.

MOOC pioneer David Comier observes that the presence of students' motivation in the MOOC context is self-evident. Comier argues that student enrollment evinces motivation. The students initially invest the effort to enroll in MOOCs in the first place (Beavin et al., 2014). Obviously, the more complicated proposition is sustaining MOOC learner motivation. Again, this definition is consistent with SDT. SDT hypothesizes that humans are naturally intrinsically motivated and that social, environmental, and other factors conspire to diminish humans' natural and most productive motivational states (Deci & Ryan, 2000). Motivation is a complex construct that requires multi-dimensional exploration (Pintrich, 2000; Shell & Husman, 2008). As such the next four subsections

explain dimensions of motivation that are 'reproposed themes' (Cook & Artino, 2016, p. 998) across learning motivation literature: competence, value, attributions, and cognition.

Competence/Ability

For learners, the construct of competence focuses on the question, "Can I do it?" Learners must believe they have the ability to demonstrate success if effort is applied (Cook & Artino, 2016). The desire to demonstrate competence foregrounds the 'self-regulated pursuit of academic goals' component of the previously provided definition of "academic motivation" from Chapter One. Obviously, without the achievement of goals it is difficult to demonstrate competence (Pintrich & Schunk, 2002). Psychogenic needs to demonstrate competence may include the pursuit of learning or mastery/performance goals (Dweck, 1986). Competence directly impacts the current study because competence is postulated to be an underlying human need in SDT (Deci & Ryan, 2000). Learning/mastery goals are concerned with genuine understanding and competence. In contrast, performance goals are directed toward cultivating the *perception* of competence (Hegarty, 2010). Goal orientations supersede, yet encompass, the educational domain. In a learning environment, learning goals emphasize personal growth and actual mastery (Dweck & Leggett, 1988; Pintrich & Schunk, 2002). MOOC learners enroll in MOOCs to grow competence in the subject area. Most MOOC learners hope that their time investment in learning results in increased success. Some MOOC learners are motivated by the opportunity to earn a formal recognition of their competence, a certificate of completion (Kizilcec & Schneider, 2015).

Value

Most theories of learning motivation include a value theme (Cook & Artino, 2016). This theme focuses on the anticipated result of academic effort, or the lack thereof. This value component usually addresses questions concerning positive or negative consequences that result because of learning effort (Cook & Artino, 2016). Some learners value learning about certain subjects more than others (Pintrich, 1989). Some learning tasks (e.g. understanding why an event happened in history) are considered to be of a higher value than others (e.g. the exact date when an event happened in history). Most learning motivation theories differ in how they incorporate task value or expectancy violation values, but the value of the learning opportunity is central to some theories of learning motivation, including SDT. A focus on results of academic effort is the underlying basis for valuing intrinsic or extrinsic rewards for learning behaviors, which is a major construct in SDT (Cook & Artino, 2016). MOOC learners may value some courses more than others. MOOC motivation intensity appears to vary across different types of MOOC enrollments (Kizilcec & Schneider, 2015).

Attributions/Locus of Control

Attribution theory describes the conscious or unconscious connection of an event and personal factors (Cook & Artino, 2016). Individuals who believe that they are able to change what happens to them are making internal attributions (Albert & Dahling, 2016). Conversely, individuals who believe they have little or no ability to affect what happens to them in life and/or in learning are making external attributions (Code, et al., 2006).

Levenson (1973) studied Locus of Control (LOC) extensively in the early 1970s. These investigations produced the Levenson Locus of Control Scale, an instrument

designed to describe an individual's LOC as internal attributions, external attributions, or attributing events to chance. The potential agents of action at work in external attributions include "chance", "fate", or "powerful others" (Levenson, 1973, pg. 398). This construct is also psychologically related to SDT.

Sisley & Smollan (2012) describe internal and external attributions to be central to SDT. Indeed, SDT is built on the dichotomy between internally exercised autonomy and externally regulated control (Gagne & Deci, 2005). LOC is a critical concept in SDT, and is one of the most mature and extensively studied constructs in academic discussions about motivation (Shell & Husman, 2008). LOC has been studied as both a superordinate construct, and as a component of, and an antecedent to motivation, although many of these factor analyses have thus far been inconclusive (Shell & Husman, 2001; 2008). LOC is a critical component of multiple theories of motivation, including Bandura's Socio-Cognitive Theory and Deci & Ryan's (2000) SDT (Shell & Husman, 2008). Students with high levels of intrinsic motivation have demonstrated more success in academic settings, in large part because they are confident in their ability to learn new things (Albert & Dahling, 2016). LOC is an important construct to the study of motivation (Code, et al., 2006).

Locus of control is applicable to studies of MOOC enrollment motivation as well. Some students are motivated by achieving a certificate of completion or the promise of success in future endeavors; others are learning in MOOCs for the basic enjoyment of learning. Learning for the pleasure of learning and learning for yourself would be indicative of an internal locus of control. Learning to earn a credential or an endorsement

from others would indicate an external locus of control that is concerned with rewards and punishments.

Cognition/Socialization

Finally, all contemporary theories of motivation are cognitive. According to Cook & Artino (2016), an individual's cognition is not developed in isolation. The learner's cognition interacts with and is affected by interaction with others (Bandura, 1986; Deci & Ryan, 2000; Siemens, 2004). Some educational psychology researchers have referred to these needs as psycho-social needs (Deci & Ryan, 2000). All modern motivation to learn theories involve a socio-cognitive component (Cook & Artino, 2016). Social dimensions of learning are explored in more detail in subsequent sections.

Many education researchers and practitioners assert that much of what students learn is social by nature (Vygotsky, 1978; Bandura, 1986). Indeed, the assumption that learning is social undergirds much of the preceding discussion of learning theories. The fact that Self Determination Theory, Socio-Cognitive Theory, and Connectivism all include *social*, *relatedness,* or *networked* components underscores the wide-spread belief that humans learn from peers in social settings. Furthermore, *relatedness* is one of the three critical constructs of SDT (Deci & Ryan, 1985, 2000, 2017). How learners socialize in MOOCS is an emerging and understudied component of researcher understanding about MOOC motivation.

The current study contributes to the validity evidence of the OLEI. The OLEI was designed to inventory the reasons individuals enroll in MOOCs or other online learning contexts (Kizilcec & Schneider, 2015). As such, a theoretical examination of learning motivation is warranted. All research questions correlate the OLEI with instruments that

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were built on SDT principles. Hence, a more robust understanding of SDT is a requisite for attempting to answer the four research questions posed in this study. The next section of this chapter decomposes SDT.

Self-Determination Theory

Self-Determination Theory (SDT) is a framework that emerged in 1985 from Rochester University psychologists Edward Deci and Richard Ryan. SDT serves as the theoretical framework for countless peer-reviewed studies on topics from breastfeeding (Kestler-Peleg et al., 2015) to suicide (Tucker & Wingate, 2014). Despite nearly four decades of hypothesis testing and academic rumination, SDT continues to fuel academic discussion about motivation and behavior (Guay et al., 2015). Deci & Ryan's (1985, 2000, & 2017) SDT asserts that motivation exists along a continuum. The continuum structure of motivation has recently gained additional support (Howard, et al., 2016) through the application of new statistical modeling methods (Litalien et al., 2017). Furthermore, scholarship evinces the presence of the three psychosocial needs that undergird the SDT (autonomy, competence, and relatedness) (Durksen et al., 2016). Additionally, these three basic psycho-social needs are related to the online motivation (Harnett et al., 2011) and efficacy of MOOC students (Durksen, et al., 2016). SDT has been explored qualitatively as a theoretical framework for studying MOOC completion motivation (Morris, 2014). Additionally, scholars have called for exploratory and confirmatory factor analytical, quantitative studies of how SDT functions in MOOCs (Morris, 2014; Xiong et. al, 2015). The application of SDT to MOOC enrollment motivation appears appropriate.

Deci and Ryan (1985) theorize that human motivation is multifaceted, involving behavioral, environmental, and biological processes and controls. Further, Deci and Ryan (1985, 2000, 2017; Ryan & Deci, 2004) assert that behavior is regulated by both internal and external forces. The dynamic dichotomy between autonomy and control is at the heart of SDT (Gagne & Deci, 2005; Deci & Ryan, 2017). Deci and Ryan (1985) hypothesize that internal cognitive psychosocial needs for competence, autonomy, and relatedness are the primary motivators for much human behavior. Autonomy, agency, or meaningful choice in decision-making and action-taking motivates humans (Guay, et al., 2000; Hartnett, et al., 2011). As the title suggests, SDT places tremendous importance on autonomy and the self-determined ability to make decisions and engage in behavior. The ability to impact one's own future motivates behavior (Deci & Ryan, 1985; 2000; 2017).

The history of psychology has investigated human needs from a variety of perspectives with different areas of emphasis for scores of years. Human needs have been described as both physiological (Hull, 1943) and psychological (Murray, 1938). Henry Murray (1938) hypothesized that human nature involved 17 universal psychogenic needs. Murray divided these into five categories: ambition, materialism, power, affection, and information. Much of Murray's scholarship, including his "System of Needs" rests firmly in the psychodynamic school of psychology (Triplet, 1992), which is characterized by attempting to understand the needs and drives of humans, especially pertaining to subconscious desires and beliefs. Murray's psychogenic needs typology was criticized as too broad and subjective (Flett, 2014); however, Murray's contribution was important because it forced psychologists to wrestle more intensely with important assumptions about motivation, drive, and goal-setting. In fact, the hypothesis that motivation was not a

unitary construct led to the development of SDT. Needs based and drive-based theories of motivation are unable to explain why humans prioritize certain drives over others. This inability to explain the prioritization of drives and needs was a factor that encouraged Deci and Ryan to look for a new way of conceptualizing motivation. (Deci & Ryan, 2017).

The behaviorists (Watson, Skinner, and Bandura) adamantly reject the psychodynamic branch of thinking (Deci & Ryan, 2017). Freudian psychology, long also labeled as psychodynamic or psychoanalytical, is built on the psychologist's desire to penetrate intellectually the mind of the patient and understand their psychological pain and trauma (Freud, 1923). Typically, the Freudian focuses primarily on psychologically significant occurrences in the past (Deci & Ryan, 2017).

Psychologist John Watson of Harvard actively criticized the psychodynamic paradigm as being unscientific, based on inadequate sample size, and not empirically verifiable (Pinder, 1998). Whereas the needs theories emphasized the satisfaction of drives or basic physiological or psychological needs, cognitive psychologists and behaviorists emphasized that all underlying behaviors were motivated by the pursuit of changing their circumstances. (Deci & Ryan, 2017).

Behaviorist efforts to explain motivation conceptualize motivation as a unitary construct (Deci & Ryan, 2017). Vroom and Bandura represent this branch of motivational theorizing; they are joined by other major behaviorist efforts to explain motivation (Deci & Ryan, 2017). Motivation as a unitary construct revolves around the concept that humans place a value for either the task or the effort spent to accomplish the task (Deci & Ryan, 2017). In other words, one property or characteristic of motivation controls and

regulates motivation. In these theories, motivation intensity is categorized by quantitative measurement of intensity, as opposed to by type or quality. Conversely, SDT views motivation as a multi-faceted and complex construct with at least three distinct domains or psychosocial needs (Deci & Ryan, 2017).

The three needs postulated by Deci & Ryan (1985, 2000, & 2017) are autonomy, competence, and relatedness. These needs are defined by SDT as, "nutrients essential for growth, integrity and well-being" (2017, p. 10). Further, Deci & Ryan (2000) explain that these nutrients are necessary for the proper functioning of psychological interest, development and wellness. Other researchers have linked the frustration of these psychological needs to the decline of physical wellness (Martela et al., 2016; Reis et al., 2000; Ryan et al., 2010). Indeed, Deci & Ryan's (2017) most recent book summarizes scores of studies using SDT instruments and methods that evince a connection between the frustration of these needs to psychopathology, self-destructive behaviors, and depression (Dwyer, Hornsey, Smith, Oei, & Dingle, 2011; Zeldman, Ryan, & Fiscella, 2004; Zuroff, Koestner, Moskowitz, McBride, & Bagby, 2012).

Deci & Ryan (1985, 2000, & 2017) discuss and situate the evolution of psychological findings and underpinnings of the SDT. At various times, SDT has been described as a break from certain psychological traditions or as an embrace of others. The exact nature of the evolution of SDT is less important than the underlying purpose recently asserted by Deci & Ryan. Simply put, Deci & Ryan (2017) saw the existing literature base as an attempt to investigate motivation for the purposes of controlling humans rather than investigating humans' natural motivation to grow and learn and improve and thrive. SDT proceeds from an appreciation of the natural curiosity, tendency

towards growth, and globally acknowledged universality of what *moves* humans to

behave, interact, live, and do. This section describes SDT as a generalized theory of

human motivation. SCT posits that motivation exists along a continuum, which is

described in the next section.

Simplex Structure of Motivation in SDT

In addition to intrinsic and extrinsic motivation, individuals also experience

amotivation, or the absence of motivation to engage in certain behaviors (Deci & Ryan,

1985). Although amotivation is the absence of motivation to complete a task or goal, two

other types of motivation are predicated on either rewards for behavior (extrinsic) or

pleasure for behavior (intrinsic). These three constructs exist along a continuum with

amotivation at the left pole representing the absence of motivation. Immediately to the

right of amotivation is extrinsic regulation. Extrinsic motivation represents the least

amount of self-directed motivation. Motivation exists, but agents for the most part, view

the task as instrumental in achieving a different, possibly related, goal. Intrinsic

motivation rest at the right-hand side of the SDT simplex motivation continuum. Intrinsic

motivation is guided by pleasure and enjoyment (Deci & Ryan, 2000). An activity is

engaged in for personal enrichment, joy, and to experience gratification. These are all

classic indicators of intrinsic motivation Deci and Ryan (1985, 2000, & 2017; Ryan &

Deci, 2004). Figure 2.1. below describes the simplex structure of motivation in Deci and

Ryan's SDT.

Figure 2.1

Motivation Continuum as depicted and Inspired by Deci & Ryan, 2017

| Amotivation | Extrinsic Motivation | Intrinsic |
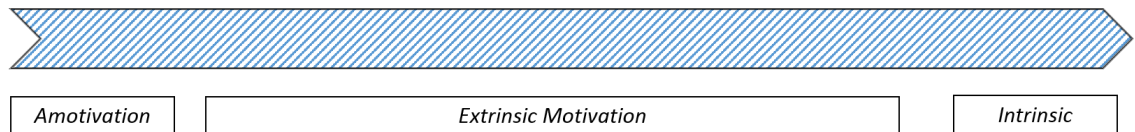
As related to the conceptual framework, this simplex continuum falls within the value construct. A value is ascribed to the learning activity. A learner engages in the learning activity to value the learning or the consequence of the learning (Vallerand et al, 2008). This component of SDT is also related to and originating from attribution theory (Deci & Ryan, 2017). Amotivation, extrinsic motivation, and intrinsic motivation are explained in the subsections that follow.

Amotivation. In SDT, amotivation explains a lack of motivation or an absence of controls that are sufficient to prompt a person into action. In the words of Deci & Ryan (2017), nothing sufficiently 'moves' the individual to act. The systems of motivation regulation available, extrinsic, intrinsic, and social are not sufficient to prompt action. Additional scholarship indicates that just as extrinsic and intrinsic motivation are composed of many types, there may also be multiple types of amotivation (Pelletier et al., 1999; Vansteenkiste et al., 2005). At least three different types of amotivation are theorized to exist: 1) inaction because effective outcome cannot be self-determined, 2) inaction due to lack of interest, and 3) inaction due to oppositional behavior (Deci & Ryan, 2017). For the purposes of this study, only one type of amotivation is operationalized by the Academic Motivation Scale (Vallerand et al., 2008). Amotivation is the absence of motivation. Despite a reported 93% of MOOC students enrolling and not successfully completing the course (Jordan, 2014) (as measured by earning a

certificate of completion), the current study is the first to use and report the results for a

psychometric measure of amotivation administered to MOOC learners. Up to this point,

most scholarship simply reports enrollment and completion and figures the success rate

based on completion of the course. This interpretation of completion fails to understand

that to many users, a MOOC is a resource, like a textbook.

Figure 2.2

The Continuum structure of SDT including regulatory types

Amotivation	Extrinsic Motivation	Intrinsic

Non-Regulation	External Regulation	Introjected Regulation	Identified Regulation	Integrated Regulation	Intrinsic Regulation
impersonal Apathy, no intention (going through the motions)	**External** External demands (rewards, punishment	**Somewhat External** Compulsion, contingent self-esteem, guilt	**Somewhat Internal** Consciously valued goals	**Internal** Values fully assimilated into self	**Pure Interest,** curiosity, challenge, enjoyment

Extrinsic motivation. Whereas amotivation describes the absence of motivation,

extrinsic motivation describes external controls of behavior (Deci & Ryan, 2000). Similar

to amotivation, extrinsic motivation demonstrates differentiation and specificity.

Extrinsic motivation includes four types of external regulatory controls. These four are

listed here from less to more self-determined: external regulation, introjected regulation,

identified regulation, and integrated regulation. Motivation is considered extrinsic if it

involves behaviors that represent a separable consequence from the behavior (e.g. an

external reward, social approval, avoidance of punishment, or attainment of a valued

outcome (Deci & Ryan, 2000). Extrinsically motivated behaviors vary widely in their

autonomy-control dichotomy. Extrinsic motivation may be completely reward or

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punishment focused. Conversely, extrinsic motivation can achieve near perfect

integration with completely intrinsically motivated behavior if the extrinsic motivation

has been sufficiently internalized and integrated (Deci & Ryan, 2000; 2017). Figure 2.3

below demonstrates this continuum.

External regulation. Whereas amotivation exists and perhaps has different types

or levels, extrinsic motivation has been extensively tested within and beyond the SDT for

decades (Deci & Ryan, 2000). External regulation is the least autonomous of extrinsic

regulatory types. External regulation is only concerned with external demands like

rewards or punishments (Deci & Ryan, 1985). Along the continuum of motivation,

external regulation is close to amotivation. According to SDT external regulation is only

one step removed from being amotivational. Theoretically, if one was engaging in an

action only to be rewarded **or to avoid punishment**, at the point when the reward stops

motivating action, then the action ceases (Deci & Ryan, 2017).

Introjected regulation. **Whereas e**xternal regulation stipulates that action must be

in furtherance of rewards and punishments, introjected regulation is the point at which the

subject begins to act in a way that is less concerned with immediate punishments or

rewards and more concerned guilt, shame, contingent self-esteem, and fear of disapproval

(Deci & Ryan, 2017). Introjected regulation is situated to the right of external control in

Figure 2.2 above. Introjected regulation describes extrinsic motivation that is aware of

external controls, and views those controls as being partially integrated into a person's

motivational mindset. However, the person's actions are still controlled by

Although most of these controls are still negative, other positive controls are still

part of introjected regulation. Sense of self, approval of others, self-aggrandizement, and

ego enhancement are all introjected regulation types of behavior. Introjected behaviors are thus experienced as internally controlling (Ryan, 1983). Deci & Ryan (2017) describe these two control types as fundamentally different. Introjected regulation is the first form of regulatory control that involves any modicum of internalized self-regulation. Finally, because introjected regulation is partially internally driven (although mostly external), introjected regulation can drive behavior in the absence of external controls. Introjected regulation is associated with internal pressure, stress, tension, and conflict (Deci & Ryan, 2017). This AMS construct should associate with several OLEI items regarding academic and professional improvement and advancement of research.

Identified regulation. Identified regulation is the next SDT motivational regulatory type (Deci & Ryan, 2000). Situated to the right of introjected regulation along the regulatory type continuum depicted in Figure 2.3 above, identified regulation describes behavior that is more internally directed than somewhat externally regulated. Motivation can be described as identification regulated when the external regulations become identified as important to the person pursuing a goal. The focus on pursuit of a future oriented goal or goal(s) differentiates this type of extrinsic motivation from introjected and integrated regulation.

Integrated regulation. Integrated regulation is the next of the SDT motivational regulatory types (Deci & Ryan, 2000). Integrated regulation represents the most autonomous of extrinsic motivation types. Integrated regulation occurs when individuals fully integrate the importance of engaging in a task into their persona. Integrated regulation is situated to the right of identified regulation in Figure 2.3. This type of extrinsic regulation is liminal (Deci & Ryan, 2000). It is almost indistinguishable from

intrinsic regulation (Deci & Ryan, 2017). As such, the Academic Motivation Scale does not measure integrated extrinsic regulation. Instead the AMS assumes this type of motivation represents intrinsic motivation and would be measured by items that measure intrinsic motivation (Deci & Ryan, 2017).

Intrinsic motivation. Deci and Ryan's early empiric work supported the idea that both autonomous and controlled motivation were present in some contexts (Deci, 1975; Deci & Ryan, 2000). However, the study of intrinsic motivation as a construct dates back to Harlow's (1950) scholarship and exploratory observations of primate interaction with their environment. Intrinsic motivation is defined as, "spontaneous activity that is sustained by the satisfactions inherent in the activity itself, and it is contrasted with activity that is functionally dependent for its occurrence or persistence on separable rewards or reinforcements" (Deci & Ryan, 2017, pg. 99). Intrinsically motivated behavior is unconcerned with external rewards and describes behaviors that are performed for the spontaneous feelings of curiosity, satisfaction, challenge, pure interest, and joy experienced in performing the behaviors (Deci & Ryan, 2000).

Behaviorist psychologists, most notably Skinner and Hull, gave rise to the construct of intrinsic motivation in investigations of operant theory and drive theories, respectively. Deci and Ryan revisited the behaviorist theories of motivation. Deci and Ryan assert that the passive, unitary, and mechanistic meta-theories of motivation upon which the behaviorist approach was predicated failed to explain why some drives were prioritized over others (Deci & Ryan (2017). Subsequently, SDT was able to explain extrinsic and socially motivated actions in addition to intrinsically motivated action (Deci

& Ryan, 1985). Deci & Ryan (2017) lay out the academic history of the underlying

scientific and behavioral postulates of intrinsic motivation going back to 1898.

SDT researchers have arrived at different conclusions regarding how complicated

and nuanced a construct intrinsic motivation actually is. Some researchers have found

support for an intrinsic motivation structure that also exists along a continuum with *to*

experience being the least self-regulated, followed by *to accomplish*, and the most self-

regulated motivation regulator is reported to be *to know* (Carbonneau et al., 2012).

Figure 2.3:

Carbonneau, Vallerand, & Lafreniere's Continuum of Intrinsic Motivation

| To experience | To accomplish | To know |

Intrinsic Regulation
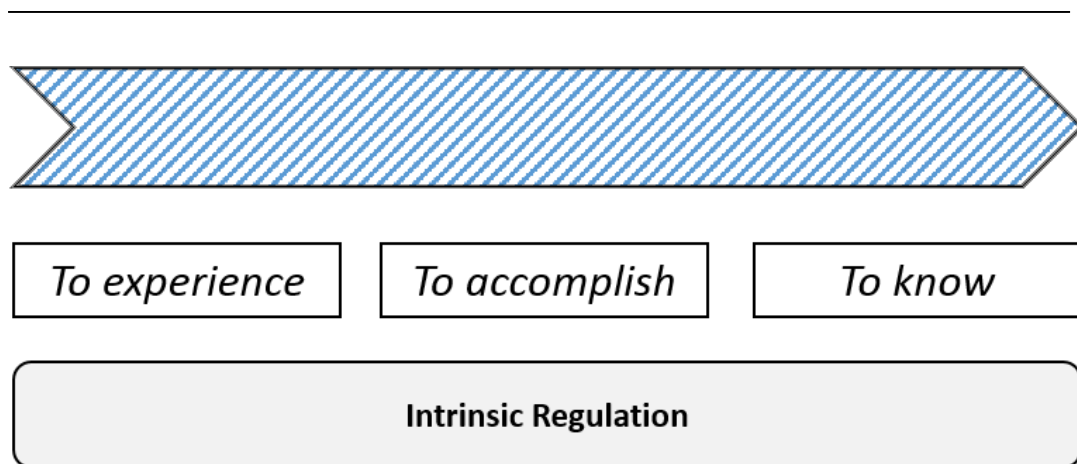
Figure 2.4 above situates the authors' theorized tripartite theory of intrinsic

motivation along a continuum. The AMS does differentiate between types of IM. The

AMS conceptualization of IM is depicted rather in Figure 2.4. Other SDT researchers

show that all three of these potentially intrinsic motivation regulatory types are distinct

(Deci, 1975; Vallerand, 1997; Vallerand et al., 1989; Vallerand et al., 1992, 1993). Deci

& Ryan (2017) are notably silent about this construct confusion. All three purported types

of intrinsic regulation are depicted in Figure 2.4 as falling into the intrinsic motivation

umbrella within established SDT cannon and as measured and operationalized by the AMS.

Continuum Summary. This section describes the motivational continuum upon which the SDT is constructed. SDT offers a promising theoretical framework that has been applied to numerous contexts (Vallerand, Pelletier, Koestner, & 2008). Myriad items across several studies have operationalized intrinsic and extrinsic motivation as variables (Deci & Ryan, 2000; 2017). SDT remains a durable theory of human behavior in large part because the three qualities of human motivation (along with the three needs each type of motivation attempts to satisfy) appear to be at work so often (Deci & Ryan, 2017). SDT posits that internal cognitive requirements for competence, autonomy, and relatedness are primary motivators of much human behavior. Humans are motivated by feeling connected to others, exercising agency in decision-making, and having their competence grow, and possibly, be recognized. Indeed, preliminary studies of MOOC motivations show these three constructs—self-efficacy, external rewards, and socialization—also affect MOOC enrollment and user motivation (Xiong, et al., 2015). SDT has been widely applied to scores of academic studies (Litalien, et al., 2017). The Academic Motivation Scale is one of the most widely applied instruments measuring motivation in educational psychology (Guay et al., 2015). The AMS is built to measure the simplex, continuum structure of the SDT (Litalien, et al., 2017).

Potentially, the simplex motivation continuum of the SDT is important to constructing the validity evidence of the OLEI. If large correlation coefficients are reported, then the OLEI is co-related to, or associated with, extrinsic, intrinsic, and social motivations, then SDT could help contextualize and construct meaningful MOOC

interventions that assist student persistence and success in MOOCs. The current study correlates the OLEI with the AMS to determine if the OLEI demonstrates concurrent validity with measures built on the SDT. The current study also investigates social motivations apparent in the OLEI and contributes to the validity evidence of the OLEI by correlating it to instruments designed to measure social motivation. Social motivations may have a relationship to extrinsic motivations and may be critical in helping MOOC learners to integrate their motivation into more internally driven motivational states. SDT is composed of six mini-theories human motivation. These six mini-theories drive SDT explanatory power and form the basis of its universal appeal.

SDT: Six mini-theories of motivation

Deci & Ryan's SDT has undergone several revisions and refinements (Deci & Ryan, 2017). Originally, Deci and Ryan (1985) hypothesized three mini-theories of SDT. Those mini-theories were cognitive evaluation theory, organismic integration theory, and causality orientations theory. SDT was revised (2000) via other findings and two additional mini-theories emerged: basic psychological needs theory and goal contents theory. These theories were codified into Deci & Ryan's cannon in 2000. Deci and Ryan recently released another book titled *Self-Determination Theory: Basic psychological needs in motivation, development and wellness* in 2017. In this work, Deci & Ryan (2017) further codify their latest revision to SDT by adding relationship motivation theory (RMT). A detailed exploration of all six of these theories is beyond the scope of this study. However, Deci and Ryan's (2017) recent book may be consulted for a comprehensive treatment. The purposes of this study are served by summarizing these six theories in the six subsections that follow.

Figure 2.4

Six Mini-theories of SDT, as articulated and Inspired by Deci & Ryan, 2017
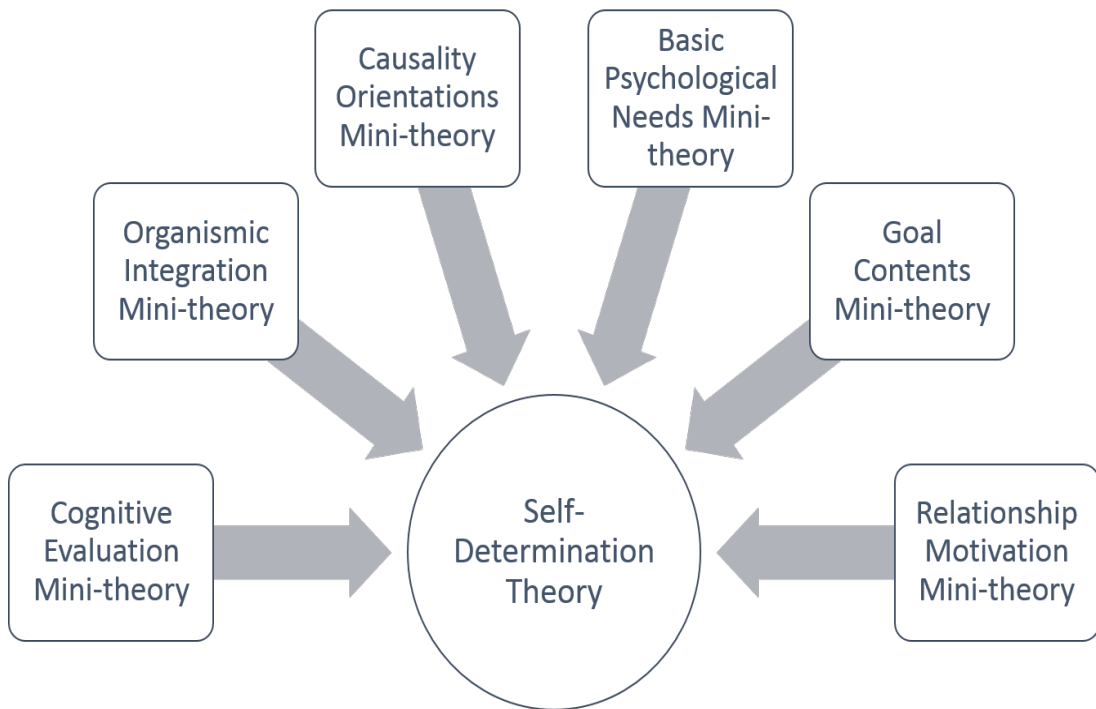
Cognitive Evaluation Theory (CET). This first SDT mini-theory describes the

processes by which social environments moderate or influence intrinsic motivation (IM).

Developed by Deci and Ryan in 1980 as a precursor to SDT, CET was later integrated

into SDT's larger framework in 1985. According to Deci and Ryan (2017), IM, as

expressed by the CET, includes "the natural and spontaneous propensities of people to

seek challenges, and assimilate new information, as well as to play and be creative with

what they already know (pg. 20)." Intrinsic motivation is operationalized by Vallerand

and the Academic Motivation Scale development team (1992). Briefly, these three

constructs in the Academic Motivation Scale are: to know, to accomplish, and to

experience. Intrinsic motivation in the current study uses the AMS to operationalize these

three constructs.

Organismic Integration Theory (OIT). According to Ryan, Connell, and Deci, (1985) the second of six mini-theories is OIT, which describes how extrinsic motivation intensifies and develops through the integration and internalization of social and cultural norms. The human mind craves belonging and relatedness (Deci & Ryan, 2017). The desire to relate to others encourages humans to assimilate to cultural norms within their organizations. OIT does not describe a process; instead, OIT depicts tendencies to internalize and integrate social and cultural regulations. Established social and cultural norms typically promote or inhibit internalization and integration (Deci & Ryan, 2017). Internalization and integration are the phenomenon that humans progressively internalize the external regulations that others place upon them. As humans aspire to further integrate into established social norms, a tendency to internalize the goals and social contexts of the established social order serves to regulate externally our behavior (Deci & Ryan, 2000). Because humans are organisms in nature that seek to improve and grow and be better at the behaviors in which they are engaged, the OIT situates extrinsic motivation as a construct that can dynamically interplay with integration and internalization. However, extrinsic motivation is not inherently destined to become intrinsic motivation (Deci & Ryan, 2000). Although motivation exists along a continuum, fluctuations in motivation levels do not cause overall motivation to change in type. The continuum of motivation according to SDT is explained in the next section.

OIT describes how SDT accounts for different social and cultural contexts. If SDT only described western phenomenon, the application of SDT would fail in international contexts (Deci & Ryan, 2017). However, quite the opposite is true. Psychologists and other social scientists throughout the globe are testing SDT in a variety

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of cultural contexts, including Japan, China, India, Turkey, Israel, Europe, Canada, the

USA, Australia, and New Zealand (Deci & Ryan, 2017). OIT describes internalization

and integration. Individual adaptation of internalization and integration into myriad of

cultural contexts is the cornerstone upon which SDT's global appeal is built.

Causality Orientations Theory (COT). Third, Deci and Ryan (2017) assert that

a number of individual-differences have been of interest to SDT researchers.

Furthermore, the individual-difference most extensively investigated by the SDT research

community is *causality orientations* (Deci & Ryan, 1985). COT postulates the existence

of three general causality orientations: autonomy orientation, control orientation, and

impersonal orientation. These orientations parallel larger SDT concepts of autonomous

motivation, controlled motivation, and amotivation. According to Deci & Ryan (2017)

the autonomy orientation refers to propensities to organize an activity by placing

emphasis on interests and values. Finally, autonomy orientation seeks out support for

interests and values in an interpersonal context.

The control orientation is concerned with organizing and regulating activity by

controlling it. Social controls, rewards, and the elimination of negative consequences for

behavior are all encompassed in the control orientation (Deci & Ryan, 2017). The control

orientation either seeks to comply or defy these external control orientations.

The impersonal causality orientation describes a tendency to orient activity in an

impersonal way within an interpersonal context. Such behavior damages the interpersonal

context and decreases motivation (Deci & Ryan, 2017). A lack of control over outcomes

and incompetence promotes amotivation. The causality orientation theory is the same

construct undergirding the previous discussion of locus of control in the conceptual framework.

Basic Psychological Needs Theory (BPNT). The fourth mini-theory of SDT hypothesizes that humans have three basic needs for autonomy, competence, and relatedness. SDT scholarship consistently supported the desire to satisfy these needs as driving human action; however, in 2000 Deci & Ryan codified them into a SDT theory with the addition of the Basic Psychological Needs Theory. The satisfaction of the needs for autonomy, competence, and relatedness contributes to human well-being and vitality (Deci & Ryan, 2017). Further, BPNT asserts that if these three basic psychological needs are supported and satisfied that instances of psychopathology decrease and even negative physical health functioning improves (Ryan, et al., 2006; Deci & Ryan, 2017). The satisfaction of these three needs is at the heart of SDT. Humans are motivated or moved to action to satisfy these psychosocial needs. The Basic Student Needs Scale, one of the instruments used in the current study, is based on this sub-theory of Self-Determination Theory.

Goal Contents Theory (GCT). The fifth mini-theory of the SDT acknowledges that humans advance and achieve progress by setting goals. Goal Attribution Theory is a major construct in motivation theory. Goal Contents Theory (GCT) acknowledges that humans are prompted by intrinsic or extrinsic aspirations (Deci & Ryan, 2017). Humans who pursue activities because they are inherently satisfying are guided by intrinsic aspirations (Kasser & Ryan, 1996). According to Deci & Ryan (2017), examples of intrinsic aspirations are things like: personal growth, meaningful relationships, and making community contributions. Conversely, humans who pursue activities because

they are instrumental in satisfying other needs are guided by extrinsic aspirations (Kasser & Ryan, 1996). Again, according to Deci & Ryan (2017) extrinsic aspirations are built around contingent satisfactions. Extrinsic aspirations make a priority of the satisfaction of needs that are not goals in and of themselves, but by accomplishing these goals, these accomplishments are instrumental in achieving a different goal. The extrinsic goal may remain unsatisfying; however, the satisfaction of the extrinsic aspiration as an instrument to having other more pressing needs met persists as important to the extrinsically motivated individual (Deci & Ryan, 2017).

  Relationship Motivation Theory (RMT). This sixth and final mini-theory is the most recent addition to SDT (Deci & Ryan, 2017). RMT summarizes what research increasingly demonstrates. Social motivations are pronounced and move humans to action. High quality interpersonal relationships are dependent on communication competence and self-disclosure (Wood, 2017). Deci & Ryan (2017) encourage humans to view rewarding interpersonal relationships as a source of psychological satisfaction. Humans need satisfying relationships both between individuals and within lager social groups. RMT acknowledges relatedness as a driver of internalization of social practices. RMT also addresses the intertwined relationship between autonomy and relatedness (Deci & Ryan, 2017).

  These six mini-theories evolved from Deci and Ryan's work with each other and with other researchers. These six mini-theories have developed as critical components of SDT theory. All of Deci & Ryan's SDT mini-theories have been subjected to additional investigation (Deci & Ryan, 2017). The next section describes the simplex structure of motivation within SDT.

Online and MOOC Learning and SDT

SDT is one of the most widely applied motivation theories (Cook & Artino, 2016; Deci & Ryan, 2017). Further, education researchers have utilized SDT as a conceptual or theoretical framework for studies investigating online learning motivation (Chen & Jang, 2011; Hartnett, et al., 2011). These studies have examined SDT and applied several survey instruments built on SDT to online learning (Hartnett, 2010). Some studies were qualitative (Shroff et al., 2008; Shroff et al., 2007); others were quantitative (Chen & Jang, 2010; Hartnett, et al., 2011). The results of these investigations report that SDT is a viable theory or model for further understanding online motivation generally (Hartnett, et al., 2011) and MOOC motivation more specifically (Morris, 2014).

Chen & Jang (2011) applied the Academic Motivation Scale to online learning in credit-bearing courses by surveying 267 online students. Chen & Jang's investigation reported that intrinsic, extrinsic, and amotivation are distinct observable constructs in online learning and found contextual support of learning needs in an online environment helped increase student motivation. Further, this study cautioned online education researchers to avoid the dichotomy that students are motivated or amotivated, instead asserting that amotivational students are learners whose needs are not being met by that course. Chen & Jang (2011) reported strong support for a structural model of online student motivation that frames motivation as stemming from intrinsic, extrinsic, and social motivations. Although several studies of SDT and online learning tested intrinsic motivation items, studies that make claims about how the extrinsic components of motivation function in the online learning contexts remains an unaddressed need within the online learning and SDT literature bases (Hartnett, et al., 2011).

MOOCS and SDT

Durksen, et al., (2016) studied MOOC learners enrolled in a course about dinosaur paleobiology at a Canadian comprehensive university. Their post-course survey was pushed to 23,252 enrolled students. Over 1000 participants responded to various items built on the SDT, including the Basic Student Needs Scale (BSNS) (Ilardi et al., 1993) and the Work-related Basic Needs Satisfaction Scale (WBSNS) (Van den Broeck et al., 2010). Both of these instruments measure SDT's asserted three psychosocial needs (autonomy, competence, relatedness). Although the BSNS measures only relatedness, Van Den Broeck et al. (2010) normed a new scale that examined relatedness in a work context and asserted that their new scale measured belonging more than relatedness. Whereas relatedness described connection, Van Den Broeck and team assert that belonging describes feeling connected to the organization as opposed to individuals within the organization. The current study accepts Durksen's prior (2011) framing of SDT moderating motivation in MOOCS. The Durksen et al. (2016) study empirically establishes that SDT is an appropriate theory to describe motivation in MOOCS and demonstrates that the three underlying needs of SDT (e.g. the need for autonomy, competence, and relatedness) are central to successful participation and satisfaction in MOOCs.

Durksen's team (2016) reports administering the AMS to the participants in their investigation; however, Durksen's team does not share any AMS results. Only the results of a Bayesian network analysis that supported the underlying needs structure of the SDT are summarized. Based on the Durksen team's results, SDT explains MOOC learner motivations to persist in MOOC studies; other studies apply the AMS to MOOCs.

Beavin et al. (2014) used self-determination in online learning as a starting point for their investigation of MOOCs. The Beavin study examined the moderating effects of participatory literacy skills on engagement with a language learning curriculum in a *Fundamentals of Language Translating* MOOC offered through Open University in the United Kingdom. This study utilized a pre and post-course survey to determine pre and post-enrollment goals and motivations. Additional results of this study are shared in the "Intention Studies" section later in this chapter. The Beavin study concludes that a standardized pre-course goal or inventory instrument is necessary to help MOOC researchers better inventory the self-determined reasons motivating students to enroll in MOOCs.

Whereas Durksen et al. (2016) tested to establish the underlying psychosocial needs of autonomy, competence, and relatedness, Beavin et al. (2014) discovered that successfully navigating a MOOC requires a high level of self-determined learning. Further, Beavin's team encouraged future studies to examine how participation literacies, the ability to connect with others in MOOCs, might moderate self-determined learning. Beavin and team conclude that a better understanding of the participatory skills necessary to succeed in MOOCs would help additional learners achieve success in MOOCs.

Zhou (2016) also used SDT as a starting point for a MOOC investigation. Zhou studied 400 Chinese MOOC students who indicated familiarity with MOOCs in recent activity on Twitter. Zhou's purposeful sample was surveyed using items developed by Ryan and Connell (1989), Learning Self-Regulation Questionnaire. Six of these items examine autonomous motivation; four of these items measure controlled motivation. Zhou's (2016) study demonstrates support for a hypothesis that alleges a relationship

between autonomous or intrinsic motivation and positive ideations about MOOCs as an educational experience. In other words, one of the best predictors of MOOC success is an attitude that MOOCs are a valuable learning tool. In short, Zhou's study also supported the hypothesis that extrinsic motivation contributes to the development of social norms in MOOCs. Although these three studies (Beavin, et al, 2014; Durksen, et al., 2016; & Zhou, 2016) all demonstrate empiric support for self-determination theory's relationship to MOOCs and academic learning motivation, Morris (2014) interviewed MOOC learners and lent conceptual support to the relationship between SDT and MOOC enrollment and completion.

Various constructs of SDT have been applied to online learning in general and MOOCs specifically. Of the three dozen peer-reviewed investigations evaluated for the current study, four specifically applied SDT to MOOCs (Beaven et al., 2014; Morris, 2014; Durksen et al, 2016; and Zhou, 2016). All four supported the application of SDT to MOOCs. All manuscripts reviewed for this study that applied SDT derived instruments to online learning in MOOCs reported high correlational and conceptual fit in their discussions or findings.

Based on a review of the literature, self-determination theory should help explain academic motivation to enroll in and learn in MOOCs. The AMS has been applied to online learning and to MOOCs. Support for the three underlying psychosocial needs of SDT within MOOCs was reported. SDT and the AMS were successfully applied to the online learning and/or MOOCs.

MOOCs and Motivation

Student enrollment motivation in MOOCs is complex, multi-dimensional area of inquiry. However, the world of MOOC motivation is situated in what educational researchers know about the broader universe of human motivation generally, and online studies and academic motivation specifically. All applicable theories of human motivation have four primary constructs that were discussed in detail earlier in this chapter (Cook & Artino, 2016). This section explores the peer-reviewed studies of motivation to enroll in or learn in MOOCs. Because many MOOCs are offered for free, students are not charged anything to register for them (Rodriguez, 2012). Consequently, enrollment in individual MOOCs is infrequently below a thousand learners and frequently exceeds tens of thousands per course (Rodriguez, 2012). Obviously, students are motivated to sign up for MOOCs; however, less than seven percent typically complete a MOOC and earn a certificate of completion (Jordan, 2014). Conversely, 45% declare a pre-course intention to finish the MOOC (Kizilcec & Schneider, 2015). MOOC enrollment and completion occur at a radically different rate. Apparently, there is a discrepancy between MOOC enrollment motivation and MOOC completion. MOOCs are unique in education. Most other educational experiences achieving a seven percent pass rate are considered failures.

Perhaps the traditional emphasis upon measuring retention, persistence, and completion is problematic. Indeed, several MOOC researchers assert that the same completion-centric metrics used to measure onsite learning are ineffective and inappropriate for investigating MOOC behavior and/or motivation (Clow, 2012; Koller et al., 2013). Instead, educational researchers are encouraged to evaluate MOOCs based on

enrollment intention (Aleman de la Garza et al., 2015). The desire to complete the course may be different for those who enrolled for different reasons (Kizilcec & Schneider, 2015; Xu & Yang, 2016). A student who is supplementing educational resources for a pre-requisite course, which they completed ten years ago, has a different enrollment intention or goal than a learner who is skipping college, wants to earn a certificate of completion in this MOOC, and use her certification as a credential pursuing employment as a big data analyst. Indeed, some MOOC researchers advance the argument that understanding MOOC enrollment intention motivation is the critical first step in understanding self-selection to enroll and subsequent resulting MOOC engagement patterns (Breslow et al., 2013). Constructs like motivation, identity, and intention are essential to establishing learning pathways (Kizilcec et al., 2013). Pathways should enable more targeted and directed personal learning via learning analytics within MOOCs (Salmon et al., 2017).

Zheng, Rosson, Shih, and Carroll (2015) studied MOOC motivation and behavior and determined that this line of inquiry had two distinct branches – user typologies and learning analytical studies. Analysis and comparison of these two branches of inquiry follows. Some learning analytical studies divided users into typologies. Others just relied on click data to operationalize variables. The use of click data sets is a new emerging trend in the field of learning analytics. The next two subsections describe learning analytic and user type MOOC motivation studies. At the end of the subsection on intention studies is a deeper dive into the OLEI. The OLEI is a MOOC enrollment intention instrument, the validation and testing of which is the focus of the current study. Subsequently, several additional dissertation literature reviews have endorsed Zheng's

team description of the literature as intention and persistence branches of inquiry (Wang et al., 2017; Zheng, 2016).

Learning Analytical or Persistence Studies

Persistence studies examine MOOC learner behaviors with an interest in learning more about what motivates students to finish or continue to progress in their MOOC studies. Many learning analytical studies are persistence studies. By examining learner online clicks, hovers, content interaction, and social activities, MOOC researchers are able to identify behaviors that contribute to success (Clow, 2012) Every action and mouse click in a MOOC is trackable and recordable (Breslow, 2013; Reich, 2013; Sandeen, 2013). Using these research methods, a variety of findings about MOOCs have been reported. Computer scientists examine data sets and look for patterns that describe engagement (Clow, 2013; Kizilcec, et al., 2013; Xu & Yang, 2015). Researchers can analyze the time spent watching lectures (Sinha, Jermann, Li & Dillenbourg, 2014), engaging in discussions (Kizilcec, et al., 2014; Shen & Kuo, 2015), or working on course assignments (Kizilcec, et al., 2013). Each activity completed within a MOOC is a datum point that describes student use (Ebben & Murphy, 2014). Other researchers used learning analytics to develop a typology of user behaviors (Kizilcec, et al., 2013; Reich, 2015; Taylor, et al., 2014).

Learning analytic studies represent student behavior in the MOOC environment (Kizilcec & Schneider, 2015). Although student use is an indicator of motivation, it does not fully explain the psychoanalytic reasoning or prioritization operating within MOOC motivation. Learning analytical studies are useful in describing behavior, but they do not

adequately describe intent, motivation, or other psychometric considerations (Kizilcec, et al., 2013; Jordan, 2014; Taylor et al., 2014; Xiong, et al., 2014; Xu & Yang, 2016).

These studies were conducted using convenience samples (Xu & Yang, 2016) and provide for large data sets, and large N and n values (Taylor, et al., 2014). For instance, MIT has released several sets of MOOC user data that regularly exceeds more than 70,000 MOOC users. MIT's data sets are available at http://odl.mit.edu/mitx-working-papers/. Amassing a data set of that size might take decades in a non-MOOC format (Taylor, et al., 2014). The learning analytical approach to persistence studies is appropriate for certain research questions. For a more detailed description of the evolution of learning analytic studies, Xu & Yang's (2016) treatment under the "Related Works" heading is recommended. Learning analytics have predominantly been associated with the study of xMOOCs.

Not all persistence studies that utilize learning analytics do so exclusively. Several studies of persistence embrace more triangulated methods, where learning analytics are used to operationalize variables, including persistence, but other variables are operationalized using self-reports (de la Garza, et al., 2015; Espinosa, et al., 2013; Kizilcec & Halawa, 2015; Kizilcec et al., 2016; Reich, 2015), discussion board posts (Breslow, et al., 2013; Xiong, et al., 2015), or other social activity (Mackness et al., 2013). Furthermore, Xiong, et al. (2015) determined that intrinsic, extrinsic, and social motivations were among the primary factors prompting continued engagement in the course. Xiong's team constructed a structural equation model of MOOC motivation and how those motivation factors influence engagement and persistence. Although Xiong's team focused on learning analytics, the primary variables identified by this team are

comprehensive. This SEM included intrinsic, extrinsic, and social motivations as moderating or influencing levels of engagement and retention. All variables in this study were operationalized with learning analytic behaviors.

Do intrinsic, extrinsic, and social motivations account for all MOOC enrollment motivations? Xiong's team (2015) recommends beginning with these variables because they offer the most promise to explain MOOC enrollment intention (Xiong, et al., 2015). The existing literature explored the OLEI for connections to intrinsic motivation and self-regulated learning, but the OLEI has yet to be correlated for either concurrent or criterion validity with instruments that measure extrinsic and social motivations. Although the Penn State team (Wilkowski et al., 2014) did not recommend that the OLEI be tested for these three enrollment desires, they do globally recommend that the drive to satisfy these three types of need may be a significant driver of MOOC behavior.

Hence, a concurrent validity correlational analysis of the OLEI with SDT inspired measures and instruments would contribute to the validity evidence of the OLEI. The construct of intrinsic, extrinsic, and social motivation are readily operationalized by the AMS-C28 (Academic Motivation Scale – College Version 28 Questions) and the MSDLCL – CL (Motivation Self-Directed Learning and Collaborative Learning scale) with Information Computer Technology subscale. The AMS measures constructs like amotivation, extrinsic, and intrinsic motivation. The AMS is well-suited to contributing to the validity evidence of the OLEI. The OLEI, AMS and three other subscales related to the study are discussed in additional detail in later sections.

Although some learning analytical studies operationalize variables and use learner behavior to predict course completion, other studies use learning analytics to develop

course user profiles for learners who engage with the MOOC in similar ways. By analyzing behavior of MOOC students, several user types were constructed. Kizilcec, Schneider, and Piech (2013) evaluated user click-stream data from several MOOC courses and asserted three basic user types: 'on track', 'behind', or 'auditing'. A fourth category of 'out' was added.

Other researchers and theorist engaged this team and helped construct a different typology based on these data (Hill, 2013; Wilkowski et al., 2014). Those typologies were not extensively tested. However, some of the terminology (e.g. lurker) has been used in other writings exploring MOOC user types (Ebben & Murphy, 2014; Xiong, 2015). User type findings were based on user behavior reported by MOOCs. Examining user interaction with assessments, videos, and discussion boards was hypothesized to be predictive of MOOC student needs (Taylor et al., 2014). Five user types emerged from various MOOC user studies, including those cited here. These five user types are: no-shows, observers, drop-ins, passive participants and active participants (Xiong, et al., 2015). Whereas Kizilcec and team's three user type study was based on click-stream data and rigorous analysis, Hill (2013) and Wilkowski, et al., (2014) appear to better explain user behavior in MOOCs. Kizilcec and team's model (2013) does not account for no-shows (students who register and never interact with the MOOC in any way beyond registration). Hill's and Wilkowsk's models are intuitive and should be investigated in future studies. Those investigations might demonstrate that Hill et al.'s (2013) user types are present and vary in levels and types of motivation. The simplex, continuum structure of the SDT as operationalized by the AMS may help to explain group differences in a future study.

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Although many researchers explored motivation related to MOOCs, these studies were predominantly based on learning analytics. Researchers examined online behavior, theorized that the behavior was prompted by a motivation theory, operationalized the construct with a behavior, measured the behavior in some way, and made observations about MOOC learner motivation (Clow, 2013). Many scholarly investigations of MOOC motivation up to this point focused on learner motivation to remain active in a course or to complete a course for certification. Only a handful of studies examined the reasons learners seek MOOC offerings in the first place.

Enrollment intention and course completion are distinct but related. When learners register in a MOOC, they are moved to action by an enrollment intention. However, that intention may or may not be related to the learner's motivation to persist or complete the MOOC. Only 45% of MOOC enrollees are interested in earning a certificate and completing the course like a traditional college course (Kizilcec & Schneider, 2015).

Each of the studies described in this section examined MOOC persistence and completion, which are indicators of intrinsic or extrinsic motivation. Because typical MOOC completion rates average seven percent (Jordan, 2014), students must have some level of motivation to complete MOOCs. Although completion and persistence are evidence of the presence of motivation, most persistence studies of MOOC motivation do not directly engage learners to generate insight into what intentions motivated them to enroll in the MOOC initially. Although behavior can evince motivation, learners can behave in ways that undermine their stated goals. Behavior never fully explains complicated constructs like psychological motivation (Deci & Ryan, 2017; Kizilcec, et

al., 2013; Terras & Ramsay, 2015; Xiong, et al., 2015; Xu & Yang, 2016; Zheng, et al., 2015).

Intention Studies

Although much of the literature examining motivation in MOOCs has evaluated persistence, a few studies focused on the reasons learners enroll in MOOCs. These intention studies examined enrollment intention using pre-course surveys or post-course surveys. Several of these studies examined only one MOOC. However, a few researchers examined several courses. Only one scale has been developed with the express aim of measuring MOOC enrollment intention, that being Kizilcec & Schneider's (2015) Online Learning Enrollment Intention Scale (OLEI).

Four examples of studies that utilized a post-course survey were Duke's Bioelectricity class (Belanger & Thornton, 2013), a report of six MOOCs produced by the University of Edinburgh (MOOCs@Edinburgh Group, 2013), a report of four MOOCs produced by the University of London (Grainger, 2013), and a study of direct motivation factors affecting Indian MOOC learners (Sooryanarayan & Gupta, 2015). These researchers examined MOOC enrollment intention using close-ended items generated by the researchers. These self-reports were not previously tested. Rather, researcher generated lists that encouraged participants to check all enrollment intentions that applied to them, and to rate how well the course satisfied their enrollment goals were used. The descriptive data reported for these four studies included a mix of intrinsic, extrinsic, and social motivations for enrollment.

Although these four studies used post-course surveys to examine enrollment intention motivation, other researchers used pre-course surveys. Results indicate strong

correlations between declaring an intention to complete the course and earning a certificate (Reich, 2013). Although pre-course and post-course intention self-reports were important first steps in measuring MOOC enrollment motivation, no studies had, prior to Kizilcec & Schneider (2015), developed scales from qualitative investigations or by using open-response items. Intention studies were the types of investigations from which the OLEI was developed. The next section describes the OLEI in detail.

The Online Learning Enrollment Intentions Scale

Kizilcec and Schneider (2015) developed and published the Online Learning Enrollment Intentions scale (OLEI) used in this study. The steps involved in the development of the OLEI were open-ended and involved large sample sizes (Kizilcec & Schneider, 2015). The scale was used twice by researchers to measure online enrollment intentions (Kizilcec & Schneider, 2015; Kizilcec et. al., 2017). Reliability in both instances was reported at .75 or greater.

According to de Barba, et al. (2016), new MOOC measures are needed. Existing psychometric measures often translate poorly into online learning contexts (Milligan et al., 2013; Xu & Yang, 2016). Shorter, even possibly single-item measurements, are needed to determine accurately and unobtrusively the cognitive, affective, and behavioral states of MOOC learners (de Barba, et al., 2016). Although the OLEI is not a single-item measure, it is short (14 potential items; thirteen closed, one open; two responses possible on closed items. A total of approximately 26 closed options).

Furthermore, the current study is a potentially significant contribution to the literature because it is possible that one or more of the OLEI items may be associated robustly enough as to be deployed in the future as a single-item measure. Additional

contributions to the validity evidence of OLEI may help MOOC researchers and professors to determine the appropriateness of the measure for evaluating both enrollment intentions and/or situational motivation in longitudinal studies.

The OLEI appears to demonstrate face validity. Despite two relatively successful norming efforts (Kizilcec & Schneider, 2015; Kizilcec, et al., 2017), the measure has not been employed widely by MOOC providers. The results of OLEI are not regularly reported by MOOC researchers. The current research effort investigates the concurrent validity of the OLEI.

Qualitative, open-ended development

Kizilcec and Schneider (2015) initiated the construction of the OLEI by asking over 8,000 students enrolled in three MOOCs "Why did you enroll in this MOOC?" The responses to these questions yielded 13 enrollment motivations for MOOC learning. Figure 2.5 below lists the 13 codes reported during Kizilcec and Schneider's (2015) investigation.

Figure 2.5

OLEi Scale

1. General interest in topic
2. Relevant to job
3. Relevant to school or degree program
4. Relevant to academic research
5. For personal growth and enrichment
6. For career change
7. For fun and challenge
8. To meet new people
9. To experience an online course
10. To earn a certificate/statement of accomplishment
11. Course offered by prestigious university/professor
12. To take with colleagues/friends
13. To improve my English skills
14. Any other reason? What? _____

Kizilcec and Schneider (2015) used a variety of methods to construct, validate, and disseminate the OLEI. Kizilcec and Schneider's efforts represent the one of the first attempts to develop a MOOC survey instrument based on qualitative inquiry. Kizilcec and Schneider randomly sampled the large data set of over 70,000 respondents three times and refined the OLEI twice. The third iteration was the finished OLEI. Experts in methodology, including Patton (2001), assert that the development of a survey should begin with qualitative inquiry that allows respondents to express a full range of responses before limiting the responses to a range. Open-ended exploration of constructs is often a vital first step in the development of an instrument. Kizilcec and Schneider accomplished this step via use of web-based, MOOC located open-ended survey items. All the intention studies described in the previous section (Belanger & Thornton, 2013; MOOCs@Edinburgh, 2013; Grainger, 2013; Sooryanarayan & Gupta, 2015) violated Patton's advice regarding instrument construction. These studies purposely limited responses without an adequate qualitative investigation to shape choices. The open-ended development process of the OLEI conforms to Patton's (2001) recommendation for the construction of survey instruments.

As previously noted, the Kizilcec and Schneider's (2015) investigation began with the single, open-ended question, 'Why did you enroll in this course?'. The question was posted in several MOOC courses offered by Stanford University faculty on Coursera and Harvard/MIT on edX. The question was answered at least 8,135 times in three different MOOCs. The subjects of the MOOCs included economics, political science, and computer science (Kizilcec & Schneider, 2015). The researchers developed 12 codes/enrollment motivations. A total of 300 responses were randomly selected from the

data set. Members of the research team noted the need for an additional code "taking the course for personal growth and enrichment". This code was added to 12 codes previously assembled.

Next, 200 responses were randomly selected from the data set and the answers were compared to the now 13 codes. Again, the OLEI was modified. This round of refinement revealed that many respondents were motivated by "improving/practicing English" or language skills. Additionally, two items were potentially confusing. Both items used the words "familiar" and "unfamiliar". Based on contextual evidence, these two words were believed to cause confusion among non-native English speakers. These two items were merged to create the "general interest" item. These two successive rounds of norming the survey instrument resulted in the current OLEI. A final item was added to the OLEI to ensure construct or face validity—an open-ended "Other" category. For the next round of validation, 300 responses were randomly drawn from the economics and political science MOOCs. Although 7% of the learners responded with an "other" motivation, those responses were assessed by the researchers as either repetitions or alternative phrasings of the codes already included in the OLEI. The research team concluded that 100% of the responses fit into one of the 13 established categories. Hence, no further changes were made to the instrument. However, the open-ended 14th item persists to ensure validity.

The final round of validation reported in the same study involved the collection of a new sample of more than 71,000 MOOC learners on the Coursera and edX platforms (Kizilcec & Schneider, 2015). This second study used learners from ten different MOOCs

to test the OLEI for reliability, validity, factor structure, and demographic correlations. Many of the results of this investigation are reported in this section.

MOOC researchers agree that greater application of established behavioral science scales to MOOCs is required (Milligan, 2013; Xiong, et al., 2015), Further, the MOOC researcher community agrees that additional study of MOOC motivation is warranted (Costano, et al., 2015; Huang & Hew, 2016; Kizilcec, et al., 2017; Kizilcec, et al., 2013; Milligan, et al., 2013; Taylor, et al., 2014). MOOC researchers need to validate and confirm the reliability of existing MOOC measures. The current study makes a modest contribution to the validity evidence of the OLEI.

Inter-item Correlations

During the original study construction and norming, Kizilcec and Schneider (2015) tested the OLEI items for inter-tem correlations with the new, larger sample. In their study, absolute correlations below 0.2 level were considered *weak*. Correlations between 0.2 and 0.4 were considered *moderate* by the study authors. A few moderate and several weak correlations were present. Specifically, several interesting inter-item correlations lend support to the hypothesis that an underlying factor structure does exist within the OLEI. Items 1 (General interest), 5 (Growth/enrichment), and 7 (Fun/challenge) were all correlated at the .20 and .21 levels respectively. These moderate inter-item correlations suggest the presence of an *intrinsic motivation* factor within the OLEI. As was previously observed, these items at face value appear to be related to intrinsic motivation.

Table 2.1

Correlation Matrix for OLEI (Kizilcec & Schneider, 2015)

Enrollment Intentions:	1	2	3	4	5	6	7	8	9	10	11	12	13
1. general interest	1.0	0.03	-0.03	-0.03	0.20	0.01	0.21	0.02	0.05	0.03	0.06	0.01	-0.01
2. relevance to job		1.0	0.11	0.15	.002	0.06	-0.04	0.02	0.00	0.08	0.06	0.06	-0.01
3. relevance to school or degree program			1.0	0.43	-0.03	0.06	-0.06	0.07	0.07	0.15	0.09	0.08	0.11
4. relevance to academic research				1.0	-0.04	0.04	-0.09	0.09	0.06	0.10	0.09	0.08	0.11
5. personal growth and enrichment					1.0	0.05	0.23	0.06	0.09	0.09	0.11	0.03	0.04
6. career change						1.0	0.02	0.16	0.07	0.19	0.11	0.06	0.11
7. fun and challenge							1.0	0.08	0.13	0.05	0.09	0.06	0.01
8. meet new people								1.0	0.22	0.21	0.17	0.22	0.21
9. experience an online course									1.0	0.18	0.16	0.15	0.23
10. earn a certificate/statement of accomplishment										1.0	0.28	0.11	0.15
11. course offered by prestigious university/professor											1.0	0.09	0.14
12. take with colleagues/friends												1.0	0.10
13. improve English skills													1.0

Items 2 (Job relevant), 3 (School relevant), and 4 (Research relevant) were all weakly correlated at the 0.11 and 0.15 levels respectively. Items 3 (School relevant), 4 (Research relevant), were strongly correlated at the .43 level. These items (3 & 4) were both weakly correlated with item 10 (Earning a certificate) at the .15 and .10 level respectively. These inter-item correlations suggest the presence of a potentially weak or unpronounced latent *extrinsic motivation* factor within the OLEI. If extrinsic motivation to enroll and persist in MOOCs is present, does it exist along the same continuum structure found present in SDT?

Next, items 8 (Meet people), 9 (Experience online), 12 (Take with others), and 13 (Improve English) were all moderately inter-item correlated as well at the 0.22 and 0.21 level. Although *experience online* is arguably an intrinsic construct, the moderate

correlations between 'meeting people', 'taking the course with others', and 'improving English' skills suggest the presence of an underlying 'social motivation' factor within the OLEI. Additionally, this inter-item correlation is another justification for correlating Kizilcec and Schneider's OLEI with the AMS and other SDT instruments that might potentially inform the nature of the relationship between social motivations and MOOC enrollment. The presence of intrinsic, extrinsic, and social enrollment motivations is consistent with other findings about online motivation (Chen & Jang, 2010) and MOOC motivation (Durksen et al., 2016; Xiong et al., 2015).

Factor Structure

Despite reporting these correlations Kizilcec and Schneider (2015), assert that the factor structure of the OLEI is resistant to additional reduction with principal component analysis. Specifically, Kizilcec and Schneider report the results of a scree plot analysis to evince this resistance to reduction. Furthermore, this analysis revealed that the optimum number of factors for the OLEI was six. The original six factors reported are: earning a certificate, meeting new people, academic motivations, vocational motivations, improving English, and interest-related motivations. These factors overlap one another. Earning a certificate, academic motivations, and vocational motivations are all extrinsic. Meeting new people and improving English both appear to be social motivations. Interest-related motivations are intrinsic. Kizilcec and Schneider (2015) originally reported factor structure appears to not fully account for findings that suggest that MOOC enrollment motivations are intrinsic, extrinsic, and social (Xiong, et al., 2015).

Additional OLEI Validity Testing

Next, the OLEI was used to measure enrollment motivation in a study of MOOC self-regulated learning strategies and goal attainment (Kizilcec, et al., 2017). This study is important because it attempted to test the OLEI's concurrent validity by correlating the OLEI with established measures of self-regulated learning (e.g. goal-setting, self-regulation, and help seeking behaviors). The Kizilcec, et al. (2017) investigation demonstrated "moderate" correlation between items on the OLEI and self-regulated learning strategies. Subjects who reported strong enrollment motivation because the MOOC was 'relevant to academic research' also reported strong reliance on five of the six self-regulated learning strategies measured: goal setting, strategic planning, task strategies, elaboration, and self-evaluation. The sixth construct under investigation was "help-seeking". This construct was predicted to be related negatively to MOOC success. Kizilcec, et al. (2017) advanced understanding of self-regulated learning in the context of MOOCs. No reliability, validity, or correlation tables, for this study of OLEI concurrent validity were reported.

Kizilcec and team's (2017) investigation correlates the OLEI with scales and subscales constructed by Hood, Littlejohn and Milligan (2015). Hood, et al. (2015) examine self-regulated learning in MOOCs for professional development. This study combines measures from Zimmerman's (2001) Expectancy Violation motivation theory and from Pintrich's (1989) Task Value motivation theory of human motivation. Hood, Littlejohn and Milligan's (2015) measure is titled the Self-Regulated Learning in MOOCs Questionnaire (SRLMQ). This measure is based on items from two different

theories of motivation. The SRLMQ is the other most discussed or referenced survey of MOOC motivation.

The 2017 study (Kizilcec et al., 2017) demonstrated support for self-regulated learning and intrinsically motivated items. Conversely, the Kizilcec and team study (2017) demonstrated inverted support for "help-seeking" social behavior. In other words, those who sought help were less likely to complete the course, despite their declared pre-enrollment or post-enrollment intentions.

Despite the testing of the OLEI for concurrent validity with instruments measuring intrinsic and self-regulated extrinsic motivation, the OLEI has not been tested for concurrent validity with measures that might further explain extrinsic enrollment motivations in the form of external regulation or amotivation. Subsequently, the OLEI should be tested for concurrent validity with various measures. The Academic Motivation Scale situates human academic motivation as a multi-faceted construct with seven different levels that occupy a continuum. Although the correlations between the OLEI and the AMS should help researchers better understand the intrinsic and extrinsic facets of MOOC enrollment motivation, other instruments are needed to assess collaborative learning motivations in MOOCs.

The Motivation in Relation to Self-Directed Learning and Collaborative Learning Questionnaire (MSDLCL) is based on Pintrich's school of motivation. Although Pintrich's Motivated Strategies for Learning Questionnaire (MSLQ) has been used in hundreds of studies, more than two MOOC studies (Kizilcec & Schneider, 2015; de Barba, et al., 2016) noted that the MSLQ items did not assume an online context.

Choy and team (2016), using the MSLQ as a starting point, developed and normed items that measure collaborative learning with information computer technology. No items measuring collaborative learning, relatedness, or belonging have been applied to the OLEI despite the fact that three of the OLEI items are clearly social: "to meet new people', "to take with colleagues/friends', and "to improve my English skills" are believed to be socially motivated.

Notably, all the confirmatory analyses of the OLEI up to this point used items and subscales from motivation theories other than SDT. In the 2017 confirmatory investigation, Kizilcec, et al. employed items from Zimmerman's and Pintrich's theories of motivation. For example, the OLEI demonstrated concurrent validity with subscales from Pintrich's MSLQ (Kizilcec, et al., 2017), which was based on Task Value motivation theory. Also, the OLEI demonstrated concurrent validity with constructs from Zimmerman's model of SRL, which is predicated on Vroom's Expectancy Value Theory of motivation as operationalized by Barnard-Brak, Paton, and Lan's (2010) items. The application of instruments designed to measure Self-Determination Theory to the OLEI is a contribution to the validity evidence of the OLEI.

OLEI Conclusion

The Academic Motivation Scale (AMS) inventories academic motivations and was briefly introduced earlier in Chapter Two. The AMS may provide clarification as to which items on the OLEI are intrinsic and which are extrinsic. Furthermore, correlations with Choy, et al's., (2016) MSDLCL – CL w/ICT Subscale may help to further elucidate if socially motivated MOOC enrollment motivations are regulated through mostly intrinsic or extrinsic mechanisms [Note: the acronym for this scale is unwieldy; it is

henceforth referred to as CLT – Collaborative Learning with Technology]. Also, the inclusion of the BSNS-R and BSNS-B should contribute additional validity evidence to potentially socially regulated factors of the OLEI.

Finally, inclusion of the amotivation subscale in the AMS in the present study provides a construct with which to measure discriminant validity for all OLEI expressed motivations. Students who initially join a MOOC due to high levels of social motivation may report amotivation if their relatedness psychosocial needs were not satisfied (Durksen et al., 2016). Students may already be demonstrating amotivation by the time they are initially surveyed. The inability of a course to satisfy adequately learner needs is occasionally mistaken for amotivation (Durksen et al., 2016).

In summary, the current study hypothesizes that survey instruments based on broader constructs of extrinsic motivation, intrinsic motivation, and social motivation are concurrently correlated with the OLEI "applies" items. Furthermore, the inclusion of the AMS subscale *Amotivation* should provide evidence for discriminant validity. According to Triola, 2005, correlation is the appropriate statistical test for measuring common associations between two scales. The previous section described the construction, norming, strengths and shortcomings of the OLEI. The next few sections describe the remaining scales and subscales used to establish the presence or absence of criterion, discriminant, and/or concurrent validity in the current study.

Academic Motivation Scale

The AMS measures motivation along seven motivation constructs, which were previously excavated in the Self-Determination Theory section. The OLEI asks participants to check all of the items that "applied". Which items moved them to enroll in

the MOOC? Because motivation undergirds the OELI is likely related to extant theories of motivation. The current study correlates MOOC student responses to the OELI with responses derived from the Academic Motivation Scale – College 28 version (Vallerand et al., 1992). The AMS conceptualizes motivation as existing along a continuum with intrinsic motivation representing one extreme, extrinsic motivation in the center, and amotivation at the other end of the motivation spectrum (See Figure 2.1). The AMS (Vallerand, et al., 1992) was originally developed in French in 1989, and translated into English and cross-culturally verified in 1992 in Canada. The AMS-C 28 is an established scale that measures mature constructs; additionally, the AMS is validated in several confirmatory studies (Guay, et al., 2015; Litalien, et al., 2017). Vallerand, et al., (1992) conducted a cross-cultural verification study that confirmed the reliability and internal validity of the AMS-C 28. For Vallerand et al.'s (1992) study, the AMS-C 28 was administered to 745 university students in the province of Ontario (Vallerand, 1992). To assess the temporal validity of the AMS-C 28, data were gathered from a smaller, follow-up sample of 57 university students one month later. In addition to the confirmatory factor analysis, test-retest correlations of the seven subscales, and analysis of variance on the means of the subscales were conducted, the results were analyzed with Chi Square, Goodness of Fit Index (GFI), the Adjusted Goodness of Fit (AGFI) and the Normed Fit Index (NFI). These indices vary from 0 to 1 where 1 indicates a perfect fit—after adjustment for cross-loads, the model fits the data. The results of the confirmatory factor analysis are subsequently reported in Table 2.2.

Table 2.2

Vallerand et al's (1992) Confirmatory Factor Analysis and Goodness of Fit Results

GFI	.94
AGFI	.91
NFI	.93

In addition to this validity testing, Vallerand, et al. (1992) subjected the AMS-C 28 to reliability/internal consistency testing. Cronbach's alpha values for the confirmatory, cross-cultural validation analysis are provided in Table 2.3 below. Cronbach's alpha is a measure of the internal consistency of an instrument (Tavakol & Dennick, 2011). Vallerand's team concluded that the AMS possesses acceptable reliability. According to Tavakol and Dennick (2011), Cronbach's alpha values ranging from .70 to .95 are acceptable. Vallerand's team determined that the outlier alpha reported for *Identified Regulation* was the product of the length of the subscale (four items). This finding is consistent with Tavakol and Dennick's prescriptions was accepted by the educational research community. Finally, the AMS was used in scores of dissertations and other academic writings to examine many groups including veterans (Morreale, 2011), community college students (Farquharson, 2004), and others.

Table 2.3

Internal Consistency Values (Cronbach's alpha and Test-Retest Correlations) of the AMS Subscales: Samples 1 and 2

	Alpha Sample 1 (n=745)	Alpha Pretest Sample 2 (n=57)	Alpha Posttest Sample 2 (n=57)	Test-Retest Correlations Sample 2 (n = 57)
Amotivation	.85	.91	.88	.83
External Regulation	.83	.85	.89	.83
Introjected Regulation	.84	.76	.83	.73
Identified Regulation	.62	.72	.78	.71
IM-to know	.84	.85	.90	.79
IM-Accomplishment	.85	.90	.87	.83
IM-Stimulation	.86	.88	.84	.80

A search in dissertations only Proquest database, on the OSU Big Orange Search System of dissertations with the phrase "Academic Motivation Scale" in the title, yielded over 150 full-text studies. The AMS is regularly used in dissertations. The AMS operationalizes amotivation, extrinsic motivation, and intrinsic motivation in this study. Although the AMS as described above operationalizes three of the four types of motivation explored in this study, social motivation is operationalized by the following subscales.

MSDLCL-CLT (CLT)

Social motivation is hypothesized to be correlated with items "applies" answers to OLEI items #8, #12, and #13. The next items in the current study are taken from a subscale that was originally developed by academic motivation luminary, Paul Pintrich and colleagues (1991), the Motivated Strategies for Learning Questionnaire (MSLQ).

Several studies of motivation utilized all or part of the MSLQ. The current study utilizes only the Peer Learning subscale as adapted by Choy et al., (2016). Social motivation was found to be a significant factor in MOOC enrollment motivation (Kizilcec & Schneider, 2015; Kizilcec, et al., 2017). The MSLQ Peer Learning subscale is intended to aid in the operationalization of this construct. According to Pintrich, et al. (1991), the MSLQ can be used in totality or the subscales can be used as stand-alone constructs. Despite some impressive uses and applications of the original MSLQ, it is assuredly geared at face-to-face teaching situations and appears initially inappropriate for use in an online context (Kizilcec & Schneider, 2017; Choy, et al., 2016).

The use of Choy and team's (2016) Motivation for Self-Directed Learning and Collaborative Learning Scale with Information Computer Technology (MSDLCL-CLT) is appropriate for this study. This acronym is unwieldy. Henceforth, this subscale is abbreviated (CLT). Choy and her team were seeking to adapt Pintrich's MSLQ to online learning contexts with high school students. One of the motivated learning strategies articulated by Pintrich and his team was peer learning. Pintrich and his team specifically noted the value in previous learning theories offered by Vygotsky and Bandura. Pintrich team's (1991) *Peer Learning* subscale in Pintrich's MSLQ is the original construct upon which Choy and her team built the Collaborative Learning (CL) subscale for the MSDLCL. Because Choy's team was seeking to understand collaborative learning motivations for students using information communication technology, they also developed a subscale that measures collaborative learning with computers (CLT).

Relevant here, two of the MSDLCL subscales assume an online context. This scale is preferable to the MSLQ upon which it was based because it is designed to

differentiate between onsite and online contexts. At least two MOOC research teams (Kizilcec, et al., 2017; Milligan, 2013) evaluated and later refrained from using components of Pintrich's MSLQ specifically because of its face-to-face, "grammar of schooling" Kizilcec & Schneider, 2015, pg. 17) origins.

The MSDLCL is used to operationalize peer learning. Peer learning is related to the construct of relatedness. Peer learning is consistent with socially motivated MOOC enrollment and persistence behaviors and should be highly correlated with OLEI measures of socially motivated enrollment intentions. Scores on the *CLT* are correlated with OLEI items #8, #12, #13 on the (*Meet new people, Take with others,* and *Improve English*, respectively).

Finally, the C*LT* Subscale of the MSDLCL yielded a Cronbach's alpha value of .92 and a construct reliability ratio of .89 (Choy, et al., 2016). Choy and team normed this subscale with a population of 1035 Singaporean high school students. These high school students used significant online components in onsite classes. This measure reports to be reliable and valid. The CLT used a seven point Likert scale.

Basic Students Needs Scale –Relatedness

Another scale used in the present study is the BSNS which is based on the Basic Psychological Needs Scale (BPNS; Durksen, et al., 2016). The BPNS emerges from the work of Illardi, Leone, Kasser, and Ryan (1993). Illardi's team examined work-related motivation from a Self-Determination Theory perspective. This research team includes Richard Ryan of Rochester University, one of the original SDT theorists.

The BSNS was constructed by two Spanish researchers based on the BPNS. Betoret and Artiga evaluated and tested all 20 original items of the BPNS (Betoret &

Artiga, 2011). Three items were excluded from the final BSNS scale due to substantial cross-loadings of greater than .30. After removing these potentially problematic items, a second factor analysis, a principal component analysis with a oblimin rotation, was conducted. From the remaining 17 items, four factors were extracted. The Relatedness subscale of the BSNS reported an impressive Cronbach's Alpha of .82 (Betoret & Artiga, 2011). The BSNS was normed from a sample of 157 Spanish undergraduate students in psychology courses. All students were volunteers (Betoret & Artiga, 2011).

The BSNS-Relatedness scale measures the construct of relatedness between a teacher and a student. This construct taps into student perception of their level of connection with the teacher and whether or not the teacher constructed a safe, welcoming, friendly, learning - environment. Two of the four items in the BSNS-Relatedness scale measure the student's feelings about the professor or teacher. The other two items directly evaluate the teacher's performance in satisfying a relatedness need (Betoret & Artiga, 2011). The *BSNS-Relatedness* uses a four point Likert scale.

Basic Student Needs Scale – Belonging

The BSNS – Belonging scale also emerged from Betoret and Artiga (2011) study of the construct of belonging as a psychological need. The Belonging construct and subscale was added to this instrument because Goodenow's (1992) contributions demonstrated a departure between feelings of ease generated by the instructor and feelings of ease generated by the student's connection or relatedness to the environment and to those around the student. The *belonging* items were borrowed from scholarship that investigated Basic Need Satisfaction at Work (Deci & Ryan, 2001). The *Belonging*

subscale of the BSNS reported an impressive Cronbach's Alpha of .86 (Betoret & Artiga, 2011).

These items are to be correlated with items that potentially demonstrate social motivation in the OLEI (#8, #12, and #13). In summary, whereas the relatedness construct, as previously described, purports to measure connection to the professor or teacher, the belonging construct purports to measure connection to other learners in a class. Relatedness is bottom-up connection to the teacher. Belonging is side-to-side, lateral connections to other learners. The BSNS-Belonging uses a four point Likert scale.

Statistical Validity

This section explores the concept of statistical validity. According to Kimberlin & Winterstein (2008), validity is, "often described as the extent to which an instrument measures what it purports to measure" (pg. 2278). The current study hopes to contribute to the validity evidence of the OLEI, but what does that mean? What is validity? Why is validity evidence important? What is the history of validity investigations? What counts as validity evidence? Are validity investigations common? What does the current study contribute to the validity evidence of the OLEI? These and other questions are subsequently answered.

Scholarship regarding statistical validity was decidedly unsettled until 1955 (McGrath, 2011). At that time, Lee Cronbach and Paul Meehl published "Construct validity in psychological tests" in the *Psychological Bulletin*. Cronbach and Meehl's manuscript has been credited with lending more coherence and uniformity in validity investigations. This manuscript remained salient because it settled many wide-ranging methodological controversies and was authored by two luminaries in the study of

psychological testing reliability and validity investigations. The manuscript was widely accepted not just because of the academic reputations of the authors, but also because it was commissioned by the *American Psychological Association's Committee on Psychological Testing*. The manuscript had staying power because of the authors and the organization they represented. At the time, the committee was attempting to bring coherence to the study of intelligence quotient (IQ) reliability, validity and factor testing (Cronboach & Meehl, 1955). Cronbach and Meehl asserted that validity is multifaceted. Significant incoherence plagued academic discussion of validity. The first mention of the academic notion of validity dates back to 1895 when Tichner and Taylor referred to it in the write-up of a psychological test (McGrath, 2011). Further Conbach and Meehl (1955) claimed that all validity evidence was classified into one of four categories. Table 2.4 is based on Conbach and Meehl's (1955) taxonomy of validity as well as later re-conceptualizations of validity by Messick (1995) and others.

Table 2.4

Different Types of Validity:

Validity Theorists:	Type of Validity:	Brief Description:	Current Study RQ:
Cronbach & Meehl (1955)	Predictive	Instrument is associated with different instrument which has demonstrated to measure the same quality? Criterion-base validity. Characterized by asynchronous indicator tests.	N/A
	Concurrent	Instrument is associated with different instrument which has demonstrated to measure the same quality? Criterion-base validity. Characterized by synchronous indicator tests.	RQ 1-3
	Content	Instrument items are situated in the universe of similar or dissimilar items?	RQ 4
	Construct	To what extent is the measure culture free?	N/A
Messick (1995)	Content	Instrument items are situated in the universe of similar items?	RQ 4
	Substantive	Theoretical rationales or models for observed consistencies in scores	RQ 1-3
	Structural	Instruments items are scaled according to other measures of the same construct: nominal, ordinal, scale.	N/A
	Generalizability	Instrument's score properties and interpretations generalize across variations in persons, settings, or tasks.	N/A
	External	Instrument score properties demonstrate convergent and divergent validity, criterion validity, consistency across multiple measures.	RQ 1-4
	Consequential	Values implications for bias, fairness, and distributive justice in score variations (e.g. standardized test scores really measure income)	N/A
N/A	Item Response Theory	Incorporates traditional validity testing with advanced multivariate methods to discover associations and latent variable traits by examining individual item responses.	N/A

Note: Table 2.4 Above is inspired by: Cronbach & Meehl, 1955; Messick, 1995; Kline, 2008)

Traditionally, concurrent or predictive validity have been considered appropriate

associations for establishing criterion validity for new and existing measures (Brown,

2000; Kimberlin & Winterstein, 2008; Price et al., 2015). Modern multivariate methods like Item Response Theory are useful to investigate latent variable associations of the instrument to itself and of the instrument to other instruments. Although modern multivariate techniques like Item Response Theory are more common in recent validity investigations (Kline, 2008), predictive and concurrent validity testing is still considered the "gold" standard by many methodologists in validity investigations of new and newer measures (Kimberlin & Winterstein, 2008). The previous sections of this chapter described the validity tests that have been reported for the OLEI.

Validity investigations are common academic contributions to researcher understanding. According to Proquest Dissertation abstracts, there are almost 6,000 dissertations with the word "validity" in the title. Three primary references summarized for this section Cronbach and Meehl (1955); Kline (2008); and McGrath (2011) establish that different types of statistical tests are applied to establish different types of validity. The current investigation uses correlations to determine concurrent, criterion-based validity for the OLEI with the AMS and other motivation measures.

Finally, most of the modern authors and theorists marshalled for this section all demonstrate agreement with the notion that validity is not considered an 'all or nothing' type of 'one-time' evaluation. Rather, multiple investigations, over a longer period of time, establish the validity of an instrument. Thus, validity is not an established or settled discussion initially for any instrument. An instrument is only considered valid after evaluating the results of multiple investigations, by different contributors, from different subjects and contexts, over an extended period of time. The current study makes a contribution to the validity evidence of the OLEI.

Research Questions

The current study poses four research questions. Each grows from common ground shared by all. Discovering the underlying motivations at work throughout MOOC student learning is important. Discovering underlying motivations for enrolling in MOOCs is a precursor to developing individualized learning at scale (Clow, 2013; Breslow, et al., 2013; Kizilcec, et al., 2013; Breslow, et al., 2013; Reich, 2015; Taylor, et al., 2014; de la Garza, et al., 2015; Kizilcec et al, 2015, Kizilcec et al, 2016; de Barba, et al., 2016; Xu & Yang, 2016; Kizilcec et al, 2017). Learners enroll in MOOCS for a variety of reasons (Jordan, 2014; Milligan et al, 2015; Kizilcec & Schneider, 2015).

Someday, MOOCs may be able to fulfill the promise of adaptive learning for large enrollments. The MOOC instructional team's use of short embedded questionnaires will create specific learning pathways. The knowledge of why a student enrolled in the MOOC in the first place will be used to create and and present an individually tailored curriculum and course specific plan of study to the learner based on the his or her needs, goals, time available for learning, and demography (de Barba, et al, 2016). Similar students can receive similar curriculum based on enrollment intention. A more thorough understanding of enrollment intention is a critical first step.

The OLEI (Online Learning Enrollment Intentions Scale) is a self-report survey that inventories MOOC enrollment motivation (Kizilcec et al, 2017). Adaptive learning at scale is predicated on accurately satisfying MOOC learner's intellectual needs that prompted MOOC enrollment (Terras & Ramsay, 2015). Satisfactory MOOC experiences can only be built on a strong foundation of validated psychometric instruments (Kizilcec, et al., 2013; Terras & Ramsay, 2015). The current study poses four research questions.

RQ1: Do average scores of the OLEI demonstrate criterion validity with the AMS extrinsic motivation subscores?

RQ2: Do the average scores of the OLEI demonstrate criterion validity with the AMS intrinsic motivation subscores?

RQ3: Do the average scores for the OLEI demonstrate criterion validity with social motivation subscores?

RQ4: Do the average scores of the OLEI demonstrate discriminant validity with the AMS amotivation subscores?

The answers to these questions may potentially advance MOOC researcher, practitioner, student and administrative understanding of enrollment motivation in MOOCs and contribute to the validity evidence of the OLEI.

Summary

Finally, connecting the motivation conceptual framework, the theoretical framework, and empiric studies of MOOC motivation is important. The conceptual framework defines academic motivation as situated within the larger realm of human motivation theories, which are generally organized around the constructs of competence, value, attribution, and cognition. These motivating forces move people to action, or in this case, learning. The theoretical framework examines SDT. This important learning motivation theory undergirds the current study. Next, several studies present strong linkages between the SDT and online learning generally and to MOOCs specifically. Further, empiric studies of motivation in MOOCs are easily categorized into persistence and intention studies. Persistence studies primarily use learning analytics to describe MOOC learners' online behaviors. Intention studies typically use pre- and post-course

surveys to examine reasons learners give for enrolling in MOOCs. These pre- and post-course response items are almost always distinct and unique with little, if any, standardization; hence, intention studies are sometimes difficult to replicate or generalize to other MOOC contexts. Kizilcec and Schneider (2015) developed the OLEI, an important contribution to MOOC research because it was the first intention study built around sound instrument development techniques. Further testing of MOOC measures in general is warranted. Specifically, this study contributes to the validity evidence of the OLEI. Further analysis of existing MOOC measures is merited in general, and specifically, the OLEI profits from being associated with additional measures to answer the research questions posed herein. The current study is designed to contribute the validity evidence of the OLEI, which measures MOOC learner enrollment intention motivation. Chapter Three describes the methodology of the present study.

CHAPTER III

METHODOLOGY

As previously observed, massively open online courses (MOOCs) possess

tremendous potential to disrupt or spur new innovation in higher education (Howarth, et

al., 2016; Al-Imarah & Shields, 2018; Rambe & Moeti, 2017; Selingo, 2013). Despite the

collection of terabytes of user-click-data, comparatively few studies have explored

motivation in MOOCs as a psychological construct (Huang & Hew, 2016; Milligan et al.,

2013; Shao, 2018). More studies of MOOC enrollment and persistence psychology are

warranted. This study adds to researcher understanding of MOOC enrollment intentions

by contributing to the validity evidence of a measure of MOOC enrollment motivation,

the Online Learning Enrollment Intentions Scale (Kizilcec & Schneider, 2015).

Chapter Three describes the methodology and research design of the current

study. Specifically, this chapter surveys the following: general perspective, research

context, research participants, instruments used in data collection, procedures used in data

collection, data analysis, and summary of methodology. This study contributes to the

researcher understanding of MOOCs by investigating the measures of association of

OLEI and additional scales and subscales to measure criterion (RQ 1, 2, and 3) and

discriminant (RQ 4) validity through association and analysis of correlation coefficients

Although the OLEI is designed to inventory MOOC enrollment motivation, it can be applied more broadly to online course enrollment motivation in general (Kizilcec & Schneider, 2015).

General Perspective

According to Crotty, an epistemology is an embedded and implicit assumption about how knowledge is produced and what constitutes knowledge (1998). Additionally, Crotty clarifies that an "epistemology is a way of understanding and explaining how we know what we know" (Crotty, 1998, pg. 3). This study is grounded in an epistemology of objectivism. Objectivism asserts that meaning exists and can be discovered. Being 'objective' implies that elements of the scientific method can be applied to research questions and through careful measurement and the uniform application of procedures, that new knowledge can be 'objectively' discovered (Crotty, 1998).

The theoretical perspective of the current study is positivist or post-positivist (Crotty, 1998). Crestwell (2003) defines the quantitative theoretical perspective and approach, "The investigator uses post-positivist claims, employs strategies of inquiry such as surveys and collects data on the predetermined instruments that yield statistical data" (p. 18). A quantitative approach is appropriate to answer research questions presented by the current study. This study seeks to use correlation to contribute to the validity evidence of the OLEI. According to Triola, (2005), the term correlation is used, "to indicate that two variables are related" (p. 16). This study investigates the relationship between the summed averages of binary, categorical data and summed averages of ordinal Likert-based scores. Each of the previously described four research questions

correlate these same types of data. The procedures are described in more detail in the "Data Analysis Methods" section that follows.

Research Context

Data gathering occurred from June 2019 through September of 2020. Two complete scales (the OLEI and the Academic Motivation Scale [AMS]) and three sub-scales (the MSDLCL-CLT, BSNS-Relatedness, and BSNS-Belonging) of self-report, survey items were used. The complete survey contained 65 items.

The above instruments all collect nominal or ordinal data. The instruments for the current study are described in Chapter Two. Estimated time to complete the survey is approximately 20 minutes. All items are available in Appendix B.

Generally, the setting for completing the survey was the internet or world-wide-web. The data were collected online using the computer software program Qualtrics. The participants provided consent before interacting with the surveys using the participant's available computer resources. The URL for the study was distributed by directly posting the URL into the MOOC discussion boards of 60 courses on two different MOOC platforms.

Specifically, the setting was the Learning Management Systems of two MOOC providers, Coursera and edX. These MOOC providers were used because they attract global enrollment, use popular instructors, and are well-established MOOC providers with millions or tens of millions of users. Furthermore, according to Class Central (Shah, 2019), in 2019 these two MOOC providers accounted for nearly 100 million of the over unique learners. These figures have grown exponentially in 2020 as more westerners have sheltered in place during covid-19 lock down (Shah, 2020).

Coursera is a for-profit MOOC provider located in Palo Alto, California. Coursera attracts multi-million dollar investments from entrepreneurs and at one point boasted about shaking up established players in higher education (Stone, 2016). Coursera reports more than 65 million people have enrolled in at least one MOOC on their platform (Shah, 2020). According to *Class Central* (Shah, 2019), a blog devoted to aggregating MOOC data, Coursera is still the largest MOOC provider in the world.

edX is a 'not-for-profit' collaboration between Harvard and MIT. edX argues that MOOCs are a learning experiment; therefore, they have approached MOOC learning with the goal of improving digital learning. edX is currently partners with Arizona State to offer the freshman year bachelor's curriculum at a fraction of what a typical residential campus charges (Stone, 2016). edX reports 32 million users (Shah, 2019). According to *Class Central*, edX delivers 18.1% of all total MOOCs world-wide (Shah, 2015).

All data collected for this study was stored in a locked file cabinet behind two locked outer doors. All survey items can be inspected in Appendix B. Participants were also asked a variety of descriptive questions about their previous participation in MOOCs. All surveys were collected electronically and stored in a password protected cloud.

Next, a description of the specific courses in which the URL was posted to discussion boards is warranted. Student motivations in MOOCs are not homogenous (Kizilcec & Schneider, 2015). For example, students may be more intrinsically motivated in an art class, extrinsically motivated in a computer programming course, and socially motivated in a TOEFL course. Indeed, some scholarship has noted this potential for variance in motivation (Kizilcec & Schneider, 2015). Because participants often have

different enrollment motivations (Howarth, et al., 2016; Kizilcec & Schneider, 2015;), it is important to target a variety of MOOCs. Specifically, this study was used to survey MOOCs from the following academic areas: business, humanities, social sciences, hard sciences, computer science/programming, math, general interest, professional education and teaching, health and medicine, and engineering. According to *Class Central* (Shah, 2015; 2016; 2017' 2018; 2019), these ten categories represent 100% of the types of MOOCs offered from 2014-2019. See Figure 3.1.

The URL for the current study's questionnaire was posted as a discussion item in three of each of the ten types of courses across the two major MOOC providers (Coursera and edX) used in the study. A total of 60 initial posts of the current study's URL were made inside of MOOC discussion boards soliciting participants during the first three days of newly started courses. The distribution also included two reminder posts in each course, for a total of three posts to each course. All relevant details regarding course postings were recorded in the researcher's log book.

Figure 3.1:

MOOC Course Distribution by Subject.
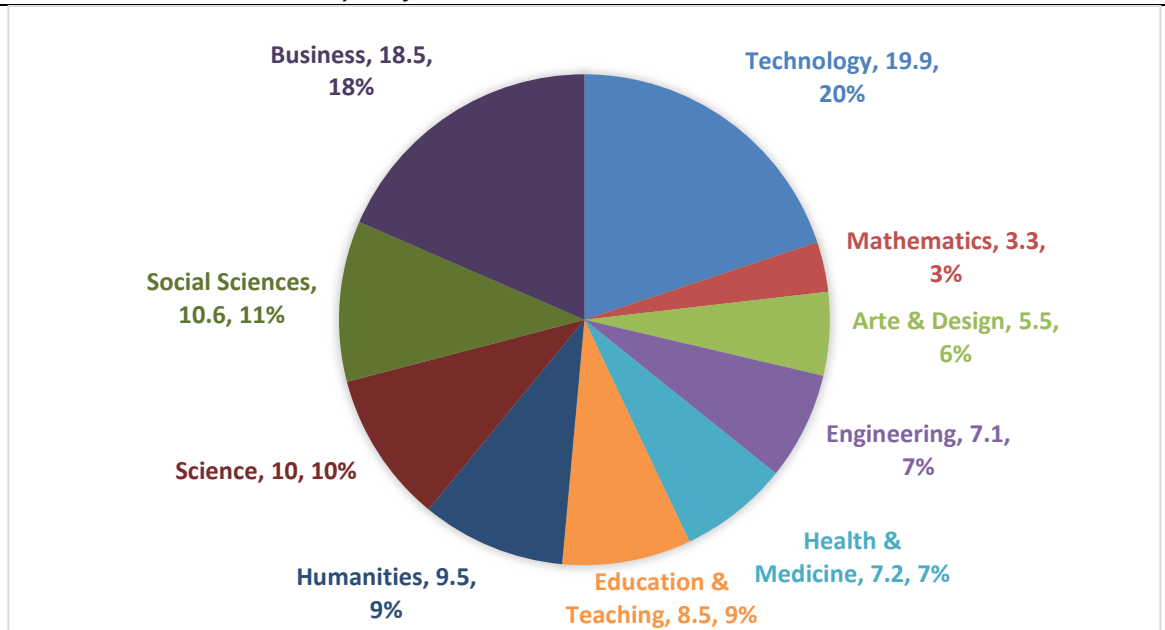
Finally, several studies report that the internet context, which typically requires the use of computer technology, tends to increase the accuracy of self-assessments. Researchers posit that the anonymity of the internet gives respondents more confidence to describe themselves more precisely and accurately without fear of judgment (Gosling, et al., 2004; Levine et al., 1989; and Locke & Gilbert, 1995). Hence, the context contributes to increased validity and reliability of the study, reducing both Type I and Type II error.

Research Participants

This current study sought computer-literate individuals from a variety of countries and continents. The research participants potentially could include any individuals who had enrolled or were currently enrolled in one of the 60 MOOCs targeted for the sample in this study. Because enrollment in the designated 60 courses was variable, it is impossible to determine the exact number of participants targeted for this sample. Participants provided consent before accessing the 64-item questionnaire and completing

the 20 minute assessment. One hundred sixteen participants interacted with the survey, and 68 participants answered all the questions and were included in the sample. The participants ranged in age from 18-78 years of age based on self-reported data. The current sample was balanced with 32 females and 35 males. Some courses attract very different male to female participant ratios (Kizilcec & Schneider, 2015). The presence of these potential motivational differences may increase the risk of Type 1 error, where a hypothesis that does have significant correlation is rejected incorrectly. Subsequently, the previously demonstrated differences in MOOC motivation based on demographics further necessitated the collection of demographic data

Additional demographic information, including age, sex, nationality, and educational level was also collected. This demographic information may help to clarify additional relationships among the variables that may be uncovered in future analyses of this data set. In particular, the collection of this demographic data may help to clarify amotivation trends if significant associations are discovered.

According to an a priori power analysis provided by GPower, the current study would require a sample size of 112 participants to ensure a 95% statistical power for a two-tailed test, thus decreasing the probability of making a Type II error. The results would be considered significant at the $\alpha_2 = .05$ level.

Data Collection Instruments

The background, development, and prior use of the instruments employed for data collection are described in ChapterTwo. Here, the name, abbreviation, number of items, author's names, response format, and construct measured are presented in Table 3.1. The

current study explores the concurrent validity of the OLEI and AMS, MSDLCL-ICT, the BSNS-Belonging and BSNS-Relatedness scales.

Online Learning Enrollment Intentions Scale

The OLEI is an individually administered, single scale, self-report instrument, which is composed of 14-items intended to measure MOOC or online enrollment motivations. Thirteen of the items utilize the same stem, "Why did you enroll in this course," with various reasons listed. To each item, a binary response scale of "Applies" or "Does not apply" is presented. One item is open-response. The item reports data with binary, categorical outputs.

Data outputs from the OLEI were dummy coded in SPSS 26. These categorical variables were separated into three subgroups (extrinsic, intrinsic, and social). Those subgroup scores were summed and averaged. The items used in each subgroups were permuted from binary data to scale averages. This permutation facilitates the use of Pearson's r as a measure of association. Those average group scores were correlated with AMS subscores and with social motivation subscale scores. Reliability, validity, and other measurement statistics of previous administrations of the scales in a research context are presented in Chapter Two. Internal consistency scores (Cronbach's Alpha) for the scales used in the current study are reported in Chapter Four. Again, the norming and standardization of short MOOC items are a critical first step in the development of personalized learning tracks. The OLEI instrument used in this study is included in Appendix B.

Academic Motivation Scale (AMS-C 28)

The AMS-C 28 is an individually administered, multiple subscale, self-report instrument, which is composed of 28-items and measures academic achievement motivation of college students on three levels utilizing seven scales. There are scores of versions of the AMS. The AMS-C 28 is the original measure validated by Vallerand and his team. The AMS-C is designed for 'College' students; Twenty eight (28) reports the number of items in the measure. The AMS uses a 7-point Likert-type response scale that ranges from 1= does not correspond at all to 7 = corresponds exactly. Sum scores may be calculated for each subscale, with scores ranging from 4 to 28. These subscores can be combined to produce a composite score. In all cases, a lower score indicates a lower agreement of motivation and a higher scores indicates a higher agreement.

The AMS-C 28 seeks to measure three types of motivation: amotivation, extrinsic motivation, and intrinsic motivation. These three sub-constructs of motivation are further specified into seven specific motivations: to know (intrinsic), to accomplish (intrinsic), to experience stimulation (intrinsic), identified regulation (extrinsic), introjected regulation (extrinsic), external regulation (extrinsic), and amotivation. This instrument is administered using any combination of the subscales. The seven subscales of the instrument each possess four items. Because the AMS-C 28 assumes a college or university contexts, study participants were instructed to substitute the word "MOOC" for "college". The AMS-C 28 is provided in Appendix B.

MSDLCL (Motivated Self-Directed Learning & Collaborative Learning) (CLT)

The previous two subsections described whole scales used in the study. The next three subsections briefly describe subscales used in the current study. The MSDLCL

measures collaborative online learning motivation. Items used in the MSDLCL originated in Pintrich et. al's line of inquiry into academic motivation. The MSDLCL collects data and utilizes a 7-point Likert response scale that ranges from 1= strongly disagree to 7 = strongly agree). According to Choy and team (2016) all MSDLCL subscales can be used independently. This is the first dissertation to use the MSDLCL or any of its subscales. No items are reverse scored. This subscale is available in Appendix B.

Basic Students Needs Scale – Relatedness

The next two scales are based specifically on Deci and Ryan (1985; 2000; 2017) Self-Determination Theory. The items of the Basic Students Needs Scale (BSNS) measure the three psychosocial needs which underpin Self-Determination Theory's underlying constructs governing human motivation: autonomy, competence, and relatedness (Betoret & Artiga, 2011). This instrument utilizes a four-point Likert scale, which ranges from 4 = I quite agree to 1 = I quite disagree. No items are reverse scored. This subscale is included in Appendix B.

Basic Student Needs Scale - Belonging

The Belonging subscale of the BSNS also originates from the Betoret and Artiga (2011) study. This instrument utilizes a four-point Likert scale, which ranges from 4 = I quite agree to 1 = I quite disagree. No items are reverse scored. This subscale is available in Appendix B.

Procedures Used in Data Collection

As stated briefly above, the data for this investigation were collected by sharing the URL for the study in the discussion sections of 60 MOOCs on two MOOC platforms, *Coursera* and *edX*. The response rate for the current study was bolstered by the offer of

an incentive for participation. Participants who complete the survey and provide an email address was registered to win one of four $50 Amazon gift cards. Each email address was assigned a number. A random number generator was used to ascribe a range and four numbers were generated. The gift cards were mailed to the four winners.

Lottery incentives offered with college-aged student populations increase response rates approximately 10% with material rewards compared to token incentives (Laguilles et al., 2011). These types of incentives give survey participants an opportunity to be entered into a lottery-style contest to win a token or material reward. One of the most common incentives offered in higher education research is a lottery type incentive (Laguilles et al., 2011). Lottery-type contests have been shown to improve both response rate and response completion in college-aged populations (Laguilles et al., 2011).

The URL for the study was posted on the initial discussion boards of 60 MOOCs on the Coursera and edX platforms. These two MOOC providers offer a variety of classes and represent MOOC participants worldwide. During the first week of the previously described sixty courses, the URL was posted to discussion boards during the months of June, July and August of 2019. Two additional follow-up discussion posts encouraged students to complete the survey. The follow-up communication was posted to each discussion board within 48-72 hours of initial posting.

Research Questions & Hypotheses

This research study asked these research questions searching for evidence to reject or not reject the alternate hypotheses below:

- RQ1: Do average scores of the OLEI demonstrate criterion validity with the AMS extrinsic motivation sub scores?
  - o H1A: OLEI average scores for items 2, 3, 4, and 6, correlates with AMS scores on the *identified regulation* subscale.

- o H1B: OLEI average scores for items 2, 3, 4, 6, 10, and 11 correlate with AMS cores on the *introjected regulation* subscale.
  - o H1C: OLEI average scores for item 2, 3, 4 & 10 correlate with AMS scores on the *external regulation* subscale.
- RQ2: Do the average scores of the OLEI demonstrate criterion validity with the AMS intrinsic motivation scores?
  - o H2A: OLEI average scores for items 1, 3, & 4 correlate with AMS subscale *to know*.
  - o H2B: OLEI average scores for items 5 & 10 correlate with AMS subscale *to accomplish*.
  - o H2C: OLEI average scores for items 7 & 9 correlate with AMS subscale *to experience stimulation*.
- RQ3: Do the average scores for the OLEI demonstrate criterion validity with measures of social motivation?
  - o H3A: OLEI average scores for items 8, 12, 13 correlate with MSDLCL subscale *Collaborative Learning*.
  - o H3B: OLEI average scores for items 8, 12, 13 correlate with the BSNS subscale *Relatedness*.
  - o H3C: OLEI average scores for items 8, 12, 13 correlate with the BSNS subscale *Belonging*.
- RQ4: Do the average scores of the OLEI demonstrate discriminant validity with measures of amotivation?
  - o H4A: Average "Does Not Apply" answers on OLEI items 1-13 correlate with AMS scores on the subscale amotivation.

Data Analysis Methods

This section details the different types of data analysis used in this study. Each of the four research questions investigated in the current study require similar data analysis procedures with different variables. All data were collected using Qualtrics. All data were analyzed using SPSS 26. Table 3.2 below summarizes the research questions and analyses used for each question.

Correlation coefficients

Because the independent variable in the present study is an average score of two or more binary OLEI items, the independent variable is measured at least at the interval

level. Hence, the most appropriate test statistic to measure the association of two variables measured at the least the interval level is a correlation coefficient (Triola, 2005.) Correlation coefficients measure the association of two variables (Lomax & Hahs-Vaughn, 2012). A specific form of correlations coefficients that is conducted after the establishment of the linearity assumption is the Pearson Product Moment Correlation or "Pearson's r". This test statistic is named after the eminent statistician who developed the statistic, Karl Pearson (Triola, 2005). Correlation coefficients run a range from +1 to -1. A positive correlation of +1 represents a perfect, positive association (X & Y both rise together in a perfect, 1-to-1, stair-step pattern along an X & Y axis). Conversely, a correlation coefficient of -1 represents a perfect, negative association (X & Y both fall together in a perfect, 1-to-1, stair-step pattern along an X & Y axis). Correlation, once commonly referred to as covariance, is a statistical test of association between two variables.

The strength of all reported correlation coefficients above were interpreted as per Table 3.2 below. These "descriptions of strength" of association were argued as appropriate for behavioral sciences as per Evans (1996).

Table 3.1

Interpreting correlation coefficients

Magnitude of Correlation	Description of Strength
0.01 to 0.19	Very Weak
0.20 to 0.39	Weak
0.40 to 0.59	Moderate
0.60 to 0.79	Strong
0.80 to 1.00	Very Strong

Once the data satisfied the linearity assumption, a "Pearson's r" was calculated. The figure for computing Pearson's r correlation coefficient was published in Nolan & Hienzen (2011), statistics textbook.

$$r = \frac{\sum [\![(X - M_X)(Y - M_Y)]\!]}{\sqrt{(SS_X)(SS_Y)}}$$

Kendall's Tau

Most of the associations performed in this study used Pearson's r to interpret pooled average scores for the OLEI items. These items were pooled with other items that were semantically related in accordance with precepts from Self Determination Theory. At times, single dichotomous, nominal, binary variables from the OLEI 'applies' or 'does not apply' were associated with interval Likert scale dependent variables. These associations were conducted to contextualize, discuss, and situate the current findings. When a single OLEI item, as opposed to an average of more than one item, was used, Kendall's Tau was determined to be the most appropriate measure of association.

Determinates of appropriate test of association

When an instrument is used to measure data on the ordinal or nominal scale, then the use of a rank-order statistical comparison are appropriate (Nolan & Heinzen, 2012). These measures of association or independence are considered "nonparametric". Parametric tests usually test at least one "metric" or "scale" variable. Nonparametric tests are used to measure association of interval/ordinal data or nominal data (categorical) data (Agresti, 1990; Nussbaum, 2015). Additionally, well-established nonparametric tests of association are Spearman's Rho and Kendall's Tau (Nolan & Heinzen, 2012; Nussbaum,

2015; Xu, et al., 2013). For a more robust discussion of these tests the similarities and differences of these two data analysis tests, consult Nussbaum and Xu, et al. (2013).

Because Kendall's Tau has multiple computational variants for dealing with tied ranks, Kendall's Tau has become the more accepted and commonly used measure of association with ordinal-ranked data (Vigna, 2014). The Asymptotic Relative Efficiency (ARE) score of Kendall's Tau is superior to Spearman's Rho (Xu et al., 2013).

$$ARE_{K\tau} (.8270) > ARE_{S\rho} (.6947)$$

Xu's team (2013) attributed superiority to Kendall's Tau over Spearman's Rho based on Tau's lower standard measurement error and robustness to impulsive noise (outliers) in contaminated-normal, non-Gaussian distributions, like the distribution in the current study. The formula for Kendall's Tau – B is shown below.

$$K_{\tau b =} \frac{(P-Q)}{\sqrt{(P+Q+X_0)\,(P+Q+Y_0)}}$$

Where as P is the number of concordant pairs, Q is the number of discordant pairs, X_0 represents the number pairs tied only on the X variable, Y_0 is the number of pairs tied only on the Y variable.

Next, when a nonparametric correlation coefficient is to be interpreted as an inferential statistic, the use of Kendall's Tau-B or Kendall's Tau-C, as opposed to Spearman's Rho or the original Kendall's Tau, is preferable (Puka, 2011). The preference is based on the fact that the equations for Kendall's Tau – B and C incorporate population estimates (Puka, 2011). The correlation coefficient of Kendall's Tau – B or C can be used to interpret inferential statistics (Puka, 2011). The inclusion of this population term in the

equation makes $K_{\tau b}$ more realistically applicable to studies that hope to make statements about the sample compared to the population when evaluating a null hypothesis.

Finally, Kendall's Tau C is a better measure in situations where the sample includes "unequal-sized sets of ordered categories" (Puka, 2011, p. 715). The formula for Kendall's Tau C accounts for uneven n terms in different categories of ordinal pairs. Theoretically, better systems for using the data across the differentiated n's make Kendall's Tau – C superior in situations where data are missing or incomplete. The sample for this study does not require the application of Kendall's Tau – C because all incomplete data were deleted prior to analysis. Hence, the primary method of analysis used in the current study is Pearson's r. However, in situations where one OLEI item is compared to a subscale on the interval level, Kendall's Tau – B is used. Functionally, these procedures are on the same 'options' page on SPSS. Kendall's Tau B is associated using the same commands. Kendall's Tau is more conservative and results in less strong associations. Kendall's Tau is less sensitive to inferential noise from outliers or incomplete data. Kendall's Tau is appropriate for the analysis of single OLEI items. Kendalls Tau is also the procedure used to associate the OLEI in Kizilcec & Schneider's (2015) original report on the scale. For a more detailed description of the tests to be conducted on the data, consult Appendix C.

Sources of variables

The nominal OLEI variables were the independent variable, or X. Items from the OLEI were averaged or pooled to create interval scores. X was the average scores of item "applies" responses to selected OLEI items. The averaging of this variable turns it into a score that is measured at the interval level. No single item-responses to OLEI questions

were utilized to compute the correlation coefficient. All X variables were the average of OLEI scores. Averages of binary, nominal variables can be computed on both single-items or on the average of two or more variables. The result of the averaging is essentially a proportion (Murray, 2018).

All 10 of the ordinal data, dependent variables, or Y, were the seven average subscores on AMS and three average subscores on the social motivation to learn subscales (MSDLCL, BSNS-B & BSNS-R). These 10 subscores were correlated with the independent variable OLEI averages. A total of 10 correlations were computed and results reported in a table. These 10 associations answer the first three research questions posed in this study. The 10 average scores for OLEI enrollment motivations were all used again in RQ4. The dependent variable for RQ4 was Amotivation. All dependent variables were computed consistent with their scoring directions. For more specifics about which items were computed into which variables, Table 3.3 below provides clarification about how variables were computed.

Both the OLEI independent variable averages and the motivation measures dependent variable averages were produced using SPSS. These 10 OLEI average scores were produced and correlated with ten motivation subscales used in the study. According to Lomax & Hahs-Vaughn (2012) Pearson's Product Moment Correlations or "Pearson's r" was the correct statistical test to assess this correlation.

Assumptions

There are three assumptions that must be satisfied when conducting a correlation: linearity, correlation is not causation, and restriction of range (Lomax & Hahs-Vaughn, 2012). The first assumption is linearity. Correlation assumes a linear relationship between

the variables exists. This assumption is visually confirmed with a scatterplot (Nolan & Hienzen, 2011). The result of violations of the linearity assumption is that the strength of the relationship can be reduced, hence increasing the risk of Type I error. The correlations were visually inspected with a scatterplot box to ensure that the linearity assumption was satisfied. Once the assumption of linearity was confirmed, Cronbach's Alpha was computed. Once the measures demonstrated appropriate internal consistency, variables were averaged, and finally, multiple Pearson's r were computed.

The second assumption offered by Lomax & Hahs-Vaughn (2012) is a reminder that correlation does not equal causation. A strong correlation between two variables merely indicates that those variables are related in some fashion. Most behavioral science investigations rarely utilize experimental designs, including but not limited to random assignment of study participants into experimental and control groups. Without significantly different data collection assumptions, correlations should not be considered causal. Even when data are collected in quasi-experimental designs, correlation typically does not equal causation. Even a ±1 correlation in the present study would not be considered causal.

Finally, the third assumption of correlation is restriction of range (Lomax & Hahs-Vaughn, 2012). The strength of correlations are decreased when the range of the sample is restricted. If, for example, this study only examined participants who scored above the mean on measures of motivation, the range of the sample would be restricted. This assumption was satisfied by using the full range of responses to the dependent variable scales and subscales.

Specific steps

Several textbooks provide detailed instructions for researchers using correlation (Lomax & Hahs-Vaughn, 2012; Nolan & Hienzen, 2011; Triola, 2005). Additionally, Nolan & Hienzen (2011), also list six steps for testing hypotheses with correlations. This chapter and Appendix C reflect the advice in that reading. Those detailed steps have been examined and summarized. The correct SPSS steps are detailed in Appendix C.

Table 3.2

Data Analyses

Research Question	Independent Categorical Variable(s)	Source of IV(s) avg. OLEI	Dependent Ordinal Variable(s)	Source of DV(s)	Analyses
1. OLEI and AMS – Extrinsic Motivation Concurrent Validity	Extrinsic motivation items of the OLEI "Applies" responses	OLEI H1A: 2, 3, 4, & 6 H1B: 2, 3, 4, 6, 10 & 11 H1C: 2, 3, 4, & 10	Mean Scores of: ExMo-Identified Regulation (EMIDR) ExMo-Introjected Regulation (EMINR) ExMo-External Regulation (EMER)	Academic Motivation Scales College – 28 (AMS-C-28) (Vallerand, Pelletier, Blais, Brière, Senecal, & Vallieres, 1992)	Correlation of mean OLEI scores motivational categories and 3 mean scores of extrinsic motivation subscales of the AMS
2. OLEI and AMS – Intrinsic Motivation Concurrent Validity	Intrinsic motivation items of the OLEI "Applies" responses	OLEI H2A: 1, 5, 7 H2B: 5 & 10 H2C: 7 & 9	Mean Scores of: InMo-To Know (IMTK) InMo-To Accomplish (IMTA) InMo-To Experience (IMTE)	Academic Motivation Scales College – 28 (AMS-C-28) (Vallerand, Pelletier, Blais, Brière, Senecal, & Vallieres, 1992)	Correlation of mean OLEI scores motivational categories and 3 mean scores of intrinsic motivation subscales of the AMS
3. OLEI and AMS – Social Motivation Concurrent Validity	Social motivation items of the OLEI "Applies" responses	OLEI: 8, 12, 13	Mean Scores of: SoMo-Collaborative Learning with Information Computer Technology (SMCL) SoMo-Basic Student Needs Scale – Relatedness (SMR) SoMo-Basic Student Needs Scale – Belonging (SMB)	Motivation for Self-Directed and Collaborative Learning with Information Computer Technology (Choy, Deng, Chai, Koh, & Tsai, 2016) Basic Student Needs Scale – Relatedness (Betoret & Artiga, 2011) SoMo-Basic Student Needs Scale – Belonging (Betoret & Artiga, 2011)	Correlation of mean OLEI scores motivational categories and 3 mean scores of social motivation from 3 subscales scores of the MSDLCL-CLw/ICT BSNS-R BSNS-B
4. OLEI and AMS – Amotivation Discriminant Validity	Amotivation items of the OLEI "Does not Apply" responses	Average OLEI items: 1-13	Mean Scores of: AMo-Amotivation (AMO)	Academic Motivation Scales College – 28 (AMS-C-28) (Vallerand, Pelletier, Blais, Brière, Senecal, & Vallieres, 1992)	Correlation of mean OLEI scores motivational categories and AMS - amotivation subscale scores

Summary

This study contributed to the validity evidence of the OLEI by correlating it with the AMS, and other subscales, to investigate criterion and discriminant validity concurrently. This study provided much needed empiric context for the emerging phenomenon of MOOCs. Relatively little is known about the levels of intrinsic and extrinsic motivation associated with MOOC learners who do not complete a course. This study furthers the understanding of teachers, researchers, administrators, and students about enrollment motivations of MOOC learners and levels of amotivation associated with different types of enrollment intentions.

Another contribution of this study is the potential advancement of the OLEI. Emerging phenomena require empirically tested and validated measures to test hypotheses and to operationalize constructs. MOOC studies currently have few or very limited metrics that allow them to compare and contrast motivation in a comprehensive or structured way (Beavin et al., 2014; de Barba et al., 2016; Terras & Ramsey, 2015). Contributing to the validity evidence of a measure that could potentially allow for more uniform comparison of enrollment motivation across MOOCs satisfies an important gap in researcher and practitioner knowledge of MOOC enrollment. Contributing to the establishment of baseline measures for enrollment motivation in MOOCs is an important additional step to providing individual learning plans and determining how well or how poorly MOOCs are meeting students' educational needs.

CHAPTER IV

RESULTS

The purpose of this study was to investigate the reliability and validity of the

Online Learning Enrollment Intentions Scale (OLEI) and to make a contribution to the

validity evidence of the OLEI. This investigation used bivariate correlation analysis to

associate mean scores on the OLEI with the seven subscale scores of Academic

Motivation Scale and with three subscale scores used to study social motivation. Four

research questions investigated levels of association or independence. The null

hypotheses for these research questions are evaluated. Chapter Four reports descriptive

statistics for the demographics, Cronbach Alpha and Kuder –Richardson test score values

for scales and subscales used in this analysis, items used in variable construction,

correlation coefficients, p values, power values achieved, and narrative descriptions of

associations.

Descriptive statistics for demographics

One hundred-sixteen participants interacted with items from the study in

Qualtrics; however, only 68 participants provided a calculable value for all 64 items.

Only the 68 participants who provided complete answers to all 64 items were included in

the analysis of the results. All responses from participants with incomplete responses

were deleted prior to the reporting of descriptive statistics and the computation of variables in SPSS. Forty-eight participants did not submit complete responses. Some of the excluded participants skipped at least one answer on at least one scale. Others completed all items up to a certain point, and then began to click through the pages to submit their email address. All incomplete participant reports were deleted. Participants were not deleted from the sample for failing to provide an email address. Thirty-two females (47%) and 35 males (51 %) were included in the sample. One participant elected not to answer the question about sex (2%). Ages ranged from 18 to 72 years of age. The mode for the age was 18 (n = 5). Other commonly reported ages (n = 4) were: 19, 27, and 34. The mean age was 35.6 years old. Country of origin mode was: United States (n = 27). Other commonly reported countries of origin were: India (n = 14), and Spain (n = 4).

Figure 4.1

Levels of Education
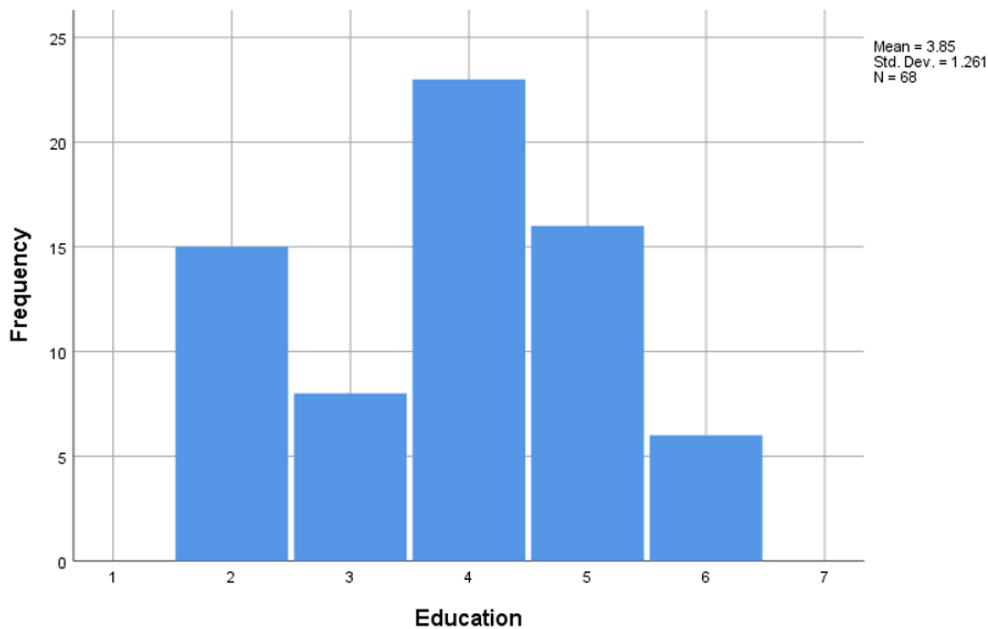
Note: The Response scale for Education Levels was 1 = high school drop-out; 2 = completed high school; 3= attempted college, did not graduate; 4 = college graduate; 5 = master's degree; 6 = doctorate; 7 = attended technical school; 8 = graduated from technical school

The sample attracted respondents from six continents: Africa, Asia, Australia, Europe, North America, and South America. Levels of education were requested. Forty-five of the sixty-eight participants in the sample (66%) reported completing their bachelor's, master's, or doctorate degree. The sample self-reports to be highly educated. These values were reported as categorical data and are displayed in Figure 4.1 above.

Tables of complete values for all descriptive statistics of the demographic are included in Appendix D.

Instruments

This section reports internal consistency reliability (Cronbach's Alpha and Kuder – Richardson's 20 Test), means, standard deviations, and skewness and kurtosis statistics for the instruments used in this analysis. The values for these statistics are reported in Table 4.1 OLEI Descriptive Statistics, Table 4.2 AMS Descriptive Statistics, Table 4.3 Social Motivation Descriptive Statistics, and Table 4.4 OLEI Average Score Descriptive Statistics. After each table of descriptive statistics, the Kruder - Richardson's 20 (dichotomous) or Cronbach Alpha (ordinal or scale) for the sample scores are reported and interpreted.

Cronbach's Alphas for the scales used in this study are reported immediately after the tables in this section. Cronbach's Alpha is a measure of internal consistency of a test or scale. Cronbach's Alpha is expressed as a number between 0 and 1 (Bland & Altman, 1997). Cronbach's Alpha reports the extent to which all of the items on a scale or subscale correlate with each other. While dimensionality is concerned with how many constructs are being measured. Cronbach's Alpha is a report of mathematical consistency that measures how the participants in the study answered the items. Cronbach's Alpha is the most frequently used reliability coefficient. Cronbach's Alpha is often interpreted as an "estimator of reliability" (Cho

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& Kim, 2015). Cronbach's Alpha, (greater than .70) ") signifies items are highly correlated with each other (Emerson, 2019). Internal consistency must be established for each data set prior to performing additional analysis on the data (Tavakol & Dennick, 2011). Cronbach's Alpha describes the amount of measurement error in a test (Emerson, 2019). If all of the items in a test are measuring the same thing, Cronbach's Alpha scores are closer to one. If the scores are closer to zero, then the items in the scale are measuring different constructs (Emerson, 2019). Internal consistency is more valued in clinical or medical tests, where .90 or even .95 is considered desirable. However, for scales used as research tools to assess groups, Cronbach Alpha values of 0.7 to 0.8 are regarded as satisfactory (Bland & Altman, 1997). If the reliability of the test is appropriate (> .80), then the items account for at least 80% of the possible measurement error (Nolan & Heinzen, 2012). Scales that report Cronbach's Alpha levels above this recommendation are considered unidimensional (Nolan & Heinzen, 2012); they only measure one construct. Scales below this threshold can increase their Alpha by adding more items that measure that construct or removing items within the scale that are not aligning with the construct being measured. Scales that depict multidimensional constructs frequently report smaller Cronbach Alpha levels. Kruder – Richardson 20 Score (KR-20) is another measure of internal consistency which is computed similarly to Cronbach's Alpha. KR-20 scores are reported when the variables are dichotomous or binary. Cronbach's Alpha is used when the variables are interval, ordinal, or scale variables.

Table 4.1

OLEI Descriptive Statistics

Item	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
OLEI_1	68	0	1	.96	.207	-4.541	19.181
OLEI_2	68	0	1	.38	.490	.495	-1.809
OLEI_3	68	0	1	.38	.490	-.495	-1.809
OLEI_4	68	0	1	.40	.493	.430	-1.871
OLEI_5	68	0	1	.96	.207	-4.541	19.181
OLEI_6	68	0	1	.32	.471	.772	-1.448
OLEI_7	68	0	1	.78	.418	-1.378	-.104
OLEI_8	68	0	1	.13	.341	2.219	3.012
OLEI_9	68	0	1	.46	.502	.181	-2.028
OLEI_10	68	0	1	.43	.498	.304	-1.966
OLEI_11	68	0	1	.53	.503	-.121	-2.047
OLEI_12	68	0	1	.15	.357	2.038	2.219
OLEI_13	68	0	1	.22	.418	1.378	-.104

Note. The response scale for all OLEI items was 1 = Applies and 0 = Does not apply.

The Kruder-Richardson (KR) 20 Test for OLEI items was .703. KR - 20 Test for standardized items was .697. The OLEI Cronbach level was above the recommended .7 level. The OLEI Cronbach's Alpha score reported for this study was .703. This score is consistent with previous scores reported for the OLEI (Kizilcec and Schnieder, 2015). The Cronbach's Alpha scores reported for the OLEI are frequently in the lower end of acceptable (>.7). Some researchers might consider a consistent Cronbach Alpha score in the low .7 range to indicate that a scale is reporting multiple underlying constructs (Cronbach, 1947). All scales reported acceptable Cronbach Alpha levels. When OLEI variables were averaged as per the associations predicted in the research questions, Cronbach's Alpha scores increased from .703 to .849.

. This increase is consistent with Tavakol & Denick, (2011) advice to group related variables together to arrive at more accurate internal consistency measurements. The increase in internal consistency may hint that the items as correlated in the study may be more inter-related to each other than they are to the rest of the test. Additional testing for eigenvalues and factor

structure would be appropriate, but is beyond the scope of this report. The values for these

variables are acceptable and additional analysis to investigate the associations in the research

questions is warranted.

Table 4.2

AMS Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
AMS_1	68	1	7	2.06	1.563	1.397	1.011
AMS_2	68	2	7	6.34	1.141	-2.010	3.766
AMS_3	68	1	7	3.90	2.338	.041	-1.554
AMS_4	68	1	7	3.87	1.915	-.016	-1.129
AMS_5	68	1	6	1.93	1.499	1.443	.888
AMS_6	68	1	7	5.15	1.847	-.984	-.067
AMS_7	68	1	7	3.69	2.332	.095	-1.567
AMS_8	68	1	7	3.31	2.153	.335	-1.332
AMS_9	68	1	7	5.94	1.244	-1.274	2.117
AMS10	68	1	7	3.82	2.311	.035	-1.567
AMS11	68	1	7	4.91	1.898	-.584	-.898
AMS12	68	1	7	2.09	1.600	1.452	1.087
AMS13	68	1	7	5.28	1.868	-1.087	.188
AMS14	68	1	7	3.71	2.286	.096	-1.562
AMS15	68	1	7	3.54	2.188	.238	-1.354
AMS16	68	2	7	6.16	1.229	-1.759	2.844
AMS17	68	1	7	3.93	2.248	.070	-1.486
AMS18	68	1	7	4.56	1.904	-.287	-1.117
AMS19	68	1	7	1.71	1.350	2.134	4.221
AMS20	68	1	7	5.07	1.806	-.770	-.326
AMS21	68	1	7	3.93	2.139	.032	-1.322
AMS22	68	1	7	3.21	2.127	.489	-1.148
AMS23	68	1	7	5.97	1.466	-1.940	3.993
AMS24	68	1	7	3.81	2.248	-.030	-1.552
AMS25	68	1	7	5.24	1.780	-1.071	.334
AMS26	68	1	7	1.65	1.347	2.453	5.674
AMS27	68	1	7	4.50	1.912	-.765	-.563
AMS28	68	1	7	4.26	2.176	-.315	-1.284

Note. All items were on a 7-point scale, where 1 = Does not correspond at all, 2 = Most often

does not correspond, 3 = Corresponds a little, 4 = Corresponds moderately, 5 = Corresponds

more often than not, 6 = Corresponds most of the time, and 7 = Corresponds exactly.

The Cronbach Alpha for the AMS items was .911. Cronbach's Alpha for Standardized items was .900. These values are consistent with previously published reports of Cronbach's Alpha for the AMS. The original confirmatory factor analysis for the AMS is reported in Chapter Two in Table 2.3

Table 4.3

Social Motivation Subscales Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
SMCL1	68	1	7	4.49	1.791	-.465	-.652
SMCL2	68	1	7	3.22	2.072	.380	-1.152
SMCL3	68	1	7	4.162	1.8737	-.256	-.985
SMCL4	68	1	7	4.18	1.900	-.207	-1.035
BSNS_R1	68	1	4	1.82	.828	.995	.803
BSNS_R2	68	1	4	1.69	.738	1.026	1.182
BSNS_R3	68	1	4	1.81	.797	.908	.689
BSNS_R4	68	1	4	1.74	.840	1.163	1.039
BSNS_B1	68	1	4	2.43	.951	.003	-.900
BSNS_B2	68	1	4	1.84	.840	.941	.573
BSNS_B3	68	1	4	2.69	1.110	-.231	-1.290
BSNS_B4	68	1	4	2.50	1.100	.000	-1.305
BSNS_B5	68	1	4	2.76	1.121	-.236	-1.369

Note. SMCL items were on a 7-point scale, where 1 = Strongly disagree, 2 = disagree, 3 = Somewhat disagree, 4 = Neither agree nor disagree, 5 = Somewhat agree, 6 = Agree, 7 = Strongly agree. Basic Student Needs Scale (Belonging and Relatedness Subscales) items were on a 4-point scale, where 1 = I quite agree, 2 = agree more than I disagree, 3 = disagree more than I agree, 4 = I quite disagree.

Because social motivation was operationalized by multiple scales, each scale required a separate Cronbach Alpha (Tavakol & Dennick, 2011). The Cronbach's Alpha for the MSDCL scale was .892. The Cronbach's Alpha for BSNS-R was .847. The Cronbach's Alpha for BSNS-B was .917.

Table 4.4

Averaged OLEI (IV) Descriptive Statistics

	N	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
H1A	68	.00	1.00	.3713	.33871	.422	-1.002
H1B	68	.00	1.00	.4069	.31065	.309	-.940
H1C	68	.00	1.00	.3824	.34887	.446	-.855
H2A	68	.00	1.00	.8971	.21746	-2.248	4.786
H2B	68	.00	1.00	.6912	.28690	.253	-.738
H2C	68	.00	1.00	.6176	.35741	-.381	-.955
H3A	68	.00	1.00	.1667	.28506	1.770	2.362
H3B	68	.00	1.00	.1838	.32212	1.550	1.179
H3C	68	.00	1.00	.1397	.28449	1.948	2.833
H3D	68	.00	1.00	.1765	.32050	1.627	1.409

Cronbach's Alpha for OLEI average variables used in study was .849. The items from the OLEI The pooling of these variables suggest that the SDT needs structure may result in better internal consistency and perhaps reliability than using the OLEI as 13 stand-alone items. The pooling of the variables as articulated in this study increased Cronbach Alpha from .703 to .849.

Variable Construction

The primary method of computing the variables was to construct average scores for OLEI items as per Table 4.5 below. Table 4.5 articulates the research questions, sources of variables, and items averaged to produce scores for variables. Scores for the AMS subscales and for social motivation subscales were constructed by averaging item scores for related items as per published instructions provided by EbscoHost APA Psyc Tests database. All scales and directions for scoring them are available in Appendix B. All variables were constructed as per the procedures outlined in Chapter Three and in concordance with Table 4.5 below.

The variables for this study operationalize the theoretical framework of Self-Determination Theory (SDT) articulated in Chapter Two. SDT postulates that humans are moved to action through one of three drivers: intrinsic, extrinsic, and social motivations. The OLEI is composed of 13 items. Approximately, half of the items are concerned with motivations that are hypothesized to demonstrate the presence of extrinsic motivation (e.g. earning a certificate of accomplishment, preparing to change jobs, or leveraging the content to do better in a for-credit college class). Three of the items on the OLEI are hypothesized to measure motivations that would be considered intrinsic (e.g. general

interest, personal growth, fun and challenge). Three of the OLEI items are hypothesized

to measure motivations that might be considered social (e.g. meet new people, take the

Table 4.5

Sources of Variables

Research Question	Independent Variable Name (OLEI)	IV Source (Mean Scores for OLEI Items)	Mean Score Label (DV)	Source of DV(s) Mean Scores for Items
1. OLEI and AMS – Extrinsic Motivation Concurrent Validity	OLEIH1A	2, 3, 4, & 6	ExMo-Identified Regulation (EMIDR)	AMS: 3, 10, 17, 24
	OLEIH1B	2, 3, 4, 6, 10 & 11	ExMo-Introjected Regulation (EMINR)	AMS: 7, 14, 21, 28
	OLEIH1C	2, 3, 4, & 10	ExMo-External Regulation (EMER)	AMS: 1, 8, 15, 22
2. OLEI and AMS – Intrinsic Motivation Concurrent Validity	OLEIH2A	1, 5, 7,	InMo-To Know (IMTK)	AMS: 2, 9, 16, 23
	OLEIH2B	5 & 10	InMo-To Accomplish (IMTA)	AMS: 6, 13, 20, 27
	OLEIH2C	7 & 9	InMo-To Experience (IMTE)	AMS: 4, 11, 18, 25
3. OLEI and AMS – Social Motivation Concurrent Validity	OLEIH3A	8, 12, 13	SMCL- Collaborative Learning with Information Computer Technology	MSDLCLwICT: 1, 2, 3, 4
	OLEIH3B	12, 13	SMR = Basic Student Needs Scale – Relatedness	BSNS-R: 1, 2, 3, 4
	OLEIH3C	8, 12	SMB = Basic Student Needs Scale – Belonging	BSNS-B: 1, 2, 3, 4, 6
	OLEIH3D	8, 13	SMB = Basic Student Needs Scale – Belonging	
4. OLEI and AMS – Amotivation Discriminant Validity	Average 10 OLEI scores above	H1A, H1B, H1C, H2A, H2B, H2C, H3A, H3B, H3C, HB4	Amotivation	AMS: 5, 12, 19, 26

course with colleagues/friends, and practice English skills). The strength of these

associations between the OLEI and existing measures of Self-Determination makes a

contribution to the validity evidence of the OLEI. Each of these motivational constructs

organizes around one of the research questions below. Research Question Four examines

amotivation. Because so many students sign-up for and never return to their MOOC,

amotivation is an important psychological construct in MOOCs. This study is one of the first to report the results of Vallerand, et. al's,Amotivation Scale.

Ten OLEI average scores (shown as various combinations of items – see column in table above) were constructed using the "Compute Variable" function in SPSS 26. Ten motivation measures subscores were constructed using the same procedure. These subscores were computed using the directions for scoring each scale and subscale. The complete scales and subscales used in this study are available in Appendix B.

Those motivation subscores were then associated with average scores from the OLEI. The items averaged together in the OLEI are hypothesized to be related. The strength of the association is reported. Table 4.6 below reports correlation coefficient, p values, and observed power for each of the hypotheses. After Table 4.7 the results from the table are narrated in a new section which is organized by research question.

Table 4.6

Pearson Correlation Coefficients, significance levels, and Power Achieved

Research Question	Independent Variable Name (OLEI)	Mean Score Label (DV)	Correlation coefficient	Significance Level	Power Analysis
H1: OLEI and AMS – Extrinsic Motivation Concurrent Validity	OLEIH1A	ExMo-Identified Regulation (EMIDR)	**r (66) = .64****	p < .05	.99
	OLEIH1B	ExMo-Introjected Regulation (EMINR)	**r (66) = .39****	p < .05	.91
	OLEIH1C	ExMo-External Regulation (EMER)	**r (66) = .60****	p < .05	.99
H2: OLEI and AMS – Intrinsic Motivation Concurrent Validity	OLEIH2A	InMo-To Know (IMTK)	**r (66) = .37***	p < .05	.88
	OLEIH2B	InMo-To Accomplish (IMTA)	r (66) = .23	p < .05	.49
	OLEIH2C	InMo-To Experience (IMTE)	r (66) = .14	p < .05	.20
H3: OLEI and Social Motivation Concurrent Validity	OLEIH3A	SMCL- Collaborative Learning with Information Computer Technology	r (66) = .16	p < .05	.25
	OLEIH3B	SMR = Basic Student Needs Scale –Relatedness	r (66) = -.17	p < .05	.28
	OLEIH3C	SMB = Basic Student Needs Scale – Belonging	r (66) = -.17	p < .05	.29
	OLEIH3D	SMB = Basic Student Needs Scale – Belonging	**r (66) = -.32***	p < .05	.75
H4: OLEI and AMS – Amotivation Discriminant Validity	Average 10 OLEI scores above	Amotivation	Reported in Table 4.9		

Notes: *. Correlation is significant at the .05 level (2-tailed). **. Correlation is significant at the .01 level (2-tailed). Correlation coefficients strong enough to reject the null hypothesis are bolded.

Correlation coefficients and p values are taken directly from SPSS. Power

analysis values were computed using "Post hoc" Power Analysis in GPower.

The strength of all reported correlation coefficients above are interpreted as per Table 4.7 below. These "descriptions of strength" were argued as appropriate for behavioral sciences as per Evans (1996).

Table 4.7

Interpreting correlation coefficients

Magnitude of Correlation	Description of Strength
0.01 to 0.19	Very Weak
0.20 to 0.39	Weak
0.40 to 0.59	Moderate
0.60 to 0.79	Strong
0.80 to 1.00	Very Strong

Note. Magnitude and Description taken from Evans (1996)

H1A: Association between OLEI items and extrinsic motivation identified regulation

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 2, 3, 4, and 6 ('relevance to job', 'relevance to research', 'relevance to degree program', and 'career change'respectively and Academic Motivation Scale subscale for Identified Regulation (EMIDR). Associations were considered significant $p < .05$. The null hypothesis was that the relationship would be 0. There is a strong, positive correlation between OLEI items 2, 3, 4, and 6 and AMS – EMIDR, $r(66) = .64^{**}$, $p < .05$. This implies that as someone's extrinsic motivation score from the OLEI (items 2, 3, 4, and 6) increases, their identified regulation scores from the AMS also strongly increases. This strong association contributes to the validity evidence of the OLEI. OLEI items 2, 3, 4, 6 ('relevance to job', 'relevance to research', 'relevance to degree program', and 'career change') are strongly associated with identified regulation as measured by the AMS. Identified regulation happens when the external regulations become identified by an actor as important to the

person pursuing a goal. For instance, a person begins to value their credit score when they realize that it is important to their ability to purchase a car.

Despite the small sample size, the probability of this association happening as a result of error is less than 1%. Propensity for Type II error with this association is low. According to GPower, the β error for this association is less than 1%. This association which is positive, is interpreted as a strong magnitude of correlation (Evans, 1996), and is statistically different from 0. Thus, the null hypothesis that the correlation is 0 was rejected at the .01 level of significance.

H1B: Association between OLEI items and extrinsic motivation introjected regulation

Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 2, 3, 4, 6, 10, and 11 and Academic Motivation Scale subscale for Introjected Regulation (EMINR). Associations were considered significant $p < .05$. The null hypothesis was that the relationship would be 0. There is a weak, positive correlation between OLEI items 2, 3, 4, 6, 10, 11 and AMS – EMINR, $r(66) = .39^{**}$, $p < .05$. This implies that as someone' extrinsic motivation score from the OLEI (items 2, 3, 4, 6, 10, 11) increases, their introjected regulation score from the AMS also increases. The positive linear relationship between the two variables is weakly associated as per Evan's framework for interpreting the association.

This weak association contributes to the validity evidence of the OLEI. OLEI items 2, 3, 4, 6, 10, 11 ('relevance to job', 'relevance to research', 'relevance to degree program', 'career change', 'earn a certificate of accomplishment, and 'course offered by a prestigious university or professor') are weakly associated with Introjected regulation

as measured by the AMS. Introjected regulation happens when the external regulations become less important and instead the person is preoccupied with guilt, shame, contingent self-esteem, and how others make them feel about themselves. For instance, a person fails to notice that their car is dirty until their passenger mentions it. Until the driver has an opportunity to clean their car, they may experience guilt or shame about the cleanliness of the car. This motivational state would be Introjected regulation. This weak association suggests that the OLEI and the AMS Introjected regulation items are weakly related. This association provides a more modest contribution to the validity evidence of the OLEI.

A Type II error occurs when a null hypothesis is not rejected, but should be. Despite the small sample size, the probability of this association happening as a result of error is less than 10% according to the β value reported by GPower. Propensity for Type II error with this association is low. This association which is positive, is interpreted as a weak correlation (Evans, 1996), and is statistically different from 0. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance.

H1C: Association between OLEI items and extrinsic motivation external regulation

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 2, 3, 4, and 10 and Academic Motivation Scale subscale for External Regulation (EMER). Associations were considered significant $p < .05$. The null hypothesis was that the relationship would be 0. There is a strong, positive correlation between OLEI items 2, 3, 4, and 10 and AMS-EMER, $r (66) = .60^{**}$, $p < .05$. This implies that as someone's extrinsic motivation score

from the OLEI (items 2, 3, 4, 10) increases, their external regulation score from the AMS also strongly increases.

This strong association contributes to the validity evidence of the OLEI. OLEI items 2, 3, 4, 10 ('relevance to job', 'relevance to research', 'relevance to degree program', and 'earn a certificate of accomplishment) are strongly associated with External regulation as measured by the AMS. External regulation happens when an actor seeks rewards or seeks to avoid punishments. External regulation is the 'stick' in the choice between a 'carrot' or a 'stick'. For instance, a person who does not speed because they do not want to receive a speeding ticket is externally regulated to obey the speed limit. This motivational state would be External regulation. This strong association suggests that the OLEI and the AMS External regulation items are strongly related. This association provides a more robust contribution to the validity evidence of the OLEI. OLEI items 2, 3, 4, and 10 strongly measure extrinsic motivation.

Type II error occurs when a null hypothesis is not rejected, but should be. Despite the small sample size, the probability of this association happening as a result of error is unlikely. Propensity for Type II error with this association is low. According to GPower, the β error for this association is less than 1%. This association, which is positive, is interpreted as a strong magnitude of correlation (Evans, 1996), and is statistically different from 0. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance.

H2A: Association between OLEI items and intrinsic motivation "to know"

Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 1, 5, and 7 and

Academic Motivation Scale subscale intrinsic motivation "To Know" regulation (IMTK). Associations were considered significant p < .05. The null hypothesis was that the relationship would be 0. There is a weak, positive correlation between OLEI items 1, 5, and 7 and AMS – IMTK, r (66) = .37*, p <.05. This implies that as someone's intrinsic motivation score from the OLEI (items 1, 5, and 7) increases, their intrinsic regulation score from the AMS subscale "To Know" also weakly increases.

This weak association contributes to the validity evidence of the OLEI. OLEI items 1, 5, and 7 ('general interest', 'personal growth and enrichment', and 'fun and challenge') are weakly associated with intrinsic motivation "To Know' as measured by the AMS. 'To Know' motivation happens when an actor seeks knowledge or skills simply for the joy of better understanding the world in which they live. Intrinsic motivation To Know would be the 'carrot' in the choice between a 'carrot' or a 'stick'. A person who takes an additional math class for fun, so they can learn more about statistics is motivated by the intrinsic motivation 'To know'. This weak association suggests that the OLEI and the AMS Intrinsic motivation 'To know' are weakly related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 1, 5, and 7 are weakly associated with the desire 'To know'.

GPower reported that this association has β error value of 1 - .88. A Type II error occurs when a null hypothesis is not rejected, but should be. Despite the small sample size, the probability of this association happening as a result of error is less than 12%. Propensity for Type II error with this association is low. This association, which is positive, is interpreted as a weak magnitude of correlation (Evans, 1996), and is

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statistically different from 0. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance.

H2B: Association between OLEI items and intrinsic motivation "to accomplish"

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 5 and 10 and Academic Motivation Scale subscale intrinsic motivation 'To Accomplish' regulation (IMTA). Associations were considered significant $p < .05$. The null hypothesis was that the relationship would be 0. There is a weak, positive correlation between OLEI items 5 and 10 and AMS – IMTA, $r(66) = .23$, $p < .05$. This implies that as someone's intrinsic motivation score from OLEI (items 5 & 10) increases, their intrinsic regulation score from AMS items 6, 13, 20, and 27 also weakly increases. Despite this association, the p value was insufficient to merit rejection of the null hypothesis.

This weak association contributes to the validity evidence of the OLEI. OLEI items 5 and 10 ('personal growth and enrichment', and 'earn a certificate of accomplishment') are weakly associated with intrinsic motivation "To accomplish' as measured by the AMS. 'To accomplish' motivation happens when an actor seeks to engage in a behavior for the pleasure they experience in surpassing their previous best attempts. Intrinsic motivation 'To Accomplish' is evident in a person tracking their time in a 5K road race. Many runners know their personal record and attempt to beat it from time to time. A runner hoping to surpass themselves is fueled by intrinsic motivation to accomplish.. This weak association suggests that the OLEI and the AMS Intrinsic motivation 'To accomplish' are weakly related. This association provides a more modest

contribution to the validity evidence of the OLEI. OLEI items 5 and 10 are weakly

associated with the desire 'To accomplish'.

GPower reported that this association has β error value of 1 - .48. A Type II error

occurs when a null hypothesis is not rejected, but should be. Because of the small sample

size, the probability of this association happening as a result of error is approximately

50%. Propensity for Type II error with this association is high.

This association, which is positive, is interpreted as a weak magnitude of

correlation (Evans, 1996), and is not statistically different from 0. Thus, the null

hypothesis that the correlation is 0 was not rejected at the .05 level of significance.

H2C: Association between OLEI items and intrinsic motivation "to experience"

A Pearson's r correlation coefficient was computed to determine if there is a

relationship between 68 participants' OLEI mean scores for items 7 and 9 and Academic

Motivation Scale subscale intrinsic motivation 'to Experience' regulation (IMTE).

Associations were considered significant $p < .05$. The null hypothesis was that the

relationship would be 0. There is a weak, positive correlation between OLEI items 7 and

9 and AMS- IMTE, $r (66) = .14$, $p < .05$. This implies that as someone's intrinsic

motivation score from the OLEI (items 7 & 9) increases, their intrinsic regulation score

from the AMS 'to Experience" scale also very weakly increases. Despite the very weak,

positive association, the association is not statistically different from zero. Thus the null

hypothesis was not rejected.

This weak association contributes to the validity evidence of the OLEI. OLEI

items 7 and 9 ('personal growth and enrichment', and 'experience an online course') are

very weakly associated with intrinsic motivation "To experience' as measured by the

AMS. 'To experience' motivation happens when an actor seeks to engage in a behavior for the pleasure they experience while enjoying that stimuli associated with the behavior. 'To experience' is evident in a person riding a roller coaster. The coaster isn't going anywhere. But people ride them because they enjoy the stimulus of the ride. This very weak association suggests that the OLEI and the AMS Intrinsic motivation 'To experience' are very weakly related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 7 and 9 are weakly associated with the desire 'To experience'.

GPower reported that this association has β error value of 1- .80, or 20%. A Type II error occurs when a null hypothesis is not rejected, but should be. Because of the small sample size, the probability of this association happening as a result of error is approximately 20%. Propensity for Type II error with this association is low. This association, which is positive, is interpreted as a very weak magnitude of correlation (Evans, 1996), and is not statistically different from 0. Thus, the null hypothesis that the correlation is 0 was not rejected at the .05 level of significance.

H3A: Association between OLEI items and social motivation "Motivation for Self Directed & Collaborative Learning with Information Computer Technology" (MSCL w/ITC)

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 8, 12, and 13 and social motivation "Self-Directed and Collaborative Learning with information communication technology" subscale (MSDCL w/ITC). Associations were considered significant p < .05.. The null hypothesis was that the relationship would be 0. There is a

very weak, positive correlation between OLEI items 8, 12, and 13 and MSCL, r (66) = .16, p < .05. This implies that as someone's social motivation score from the OLEI (items 8, 12, and 13) increases, their social motivation score from the SMCL also very weakly increases.

This very weak association contributes to the validity evidence of the OLEI. OLEI items 8, 12, and 13 ('meet new people', 'take with friends/colleagues', and 'improve my English skills') are very weakly associated with social motivation as measured by the Motivated for Self-Directed and Collaborative Learning – with Internet Communication Technology Subscale (MSDCL-w/ITC). Social motivation happens when an actor seeks to engage in a behavior for the pleasure they experience while enjoying social interactions and activities with others which are associated with the behavior. 'Social motivation is evident in a person connecting with other people. Many human motivations are social in nature. The MSDCL-w/ITC subscale includes items that inquire about cooperation and teamwork. This very weak association suggests that the OLEI and the Social motivation as measured by the MSDCL-w/ITC are very weakly related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 8, 12, and 13 are weakly associated with the desire 'To experience'.

GPower reported that this association has β error value of 1- .26, or 74%. A Type II error occurs when a null hypothesis is not rejected, but should be. Because of the small sample size, the probability of this association happening as a result of error is approximately 74%. Propensity for Type II error with this association is high. This association, which is positive, is interpreted as a very weak magnitude of correlation

(Evans, 1996), and is not statistically different from 0. Thus, the null hypothesis that the correlation is 0 was not rejected at the .05 level of significance.

H3B: Association between OLEI items and social motivation "Basic Student Needs Scale - Relatedness" (BSNS-R)

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 12, and 13 and Basic Student Needs Scale – Relatedness subscale (BSNS-R). Associations were considered significant $p < .05$.

The null hypothesis was that the relationship would be 0. There is a weak, negative correlation between OLEI items 12 and 13 and BSNS-R, $r (66) = -.17$, $p < .05$. This association implies that as someone's social motivation score from the OLEI (items 12 & 13) decreases that their social regulation score from the BSNS-R very weakly increases or vice versa. As one value increases, the other decreases.

This very weak, negative association contributes to the validity evidence of the OLEI. OLEI items 12 and 13 ('take with friends/colleagues' and 'improve my English skills') are very weakly, negatively associated with social motivation as measured by the Basic Student Needs Scale-Relatedness subscale. Social motivation happens when an actor seeks to engage in a behavior for the pleasure they experience while enjoying social interactions and activities with others which are associated with the behavior. 'Social motivation is evident in a person connecting with other people. Many human motivations are social in nature. Relatedness as a social construct describes an individual's level of connection with other individuals in a social context. Whereas 'belonging' describes an individual's level of connection to the organizations or structures within a social context.

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This very weak, negative association suggests that the OLEI and the Social motivation as measured by the BSNS-R are very weakly, negatively related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 12 and 13 are weakly, negatively associated with the desire to socialize.

GPower reported that this association has β error value of 1- .28, or 72%. A Type II error occurs when a null hypothesis is not rejected, but should be. Because of the small sample size, the probability of this association happening as a result of error is approximately 72%. Propensity for Type II error with this association is his association, which is negative, is interpreted as a weak magnitude of correlation (Evans, 1996), and is not statistically different from 0. Thus, the null hypothesis that the correlation is 0 was not rejected at the .05 level of significance.

H3C: Association between OLEI items and social motivation "Basic Student Needs Scale - Belonging" (BSNS-B)

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 8 and 12 and social motivation Basic Student Needs Scale – Belonging subscale (BSNS-B). Associations were considered significant $p < .05$..The null hypothesis was that the relationship would be 0. There is a very weak, negative correlation between OLEI items 8 and 12 and BSNS-B, $r (66) = -.17$, $p < .05$. This association implies that as someone's social motivation score from the OLEI (items 8 & 12) decreases that their social regulation score from the BSNS-R very weakly increases, or vice versa. As one value increases, the other decreases. Despite this very weak association, the difference is not statistically different enough from 0 to reject the null hypothesis.

This very weak, negative association contributes to the validity evidence of the OLEI. OLEI items 8 and 12 ('meet new people' and 'take with friends/colleagues') are very weakly, negatively associated with social motivation as measured by the Basic Student Needs Scale-Belonging subscale. Social motivation happens when an actor seeks to engage in a behavior for the pleasure they experience while enjoying social interactions and activities with others which are associated with the behavior. 'Social motivation is evident in a person connecting with other people. Many human motivations are social in nature. Relatedness as a social construct describes an individual's level of connection with other individuals in a social context. Whereas 'belonging' describes an individual's level of connection to the organizations or structures within a social context.

This very weak, negative association suggests that the OLEI and the Social motivation as measured by the BSNS-R are very weakly, negatively related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 8 and 12 are weakly, negatively associated with the desire to socialize.

GPower reported that this association has β error value of 1- .28, or 72%. A Type II error occurs when a null hypothesis is not rejected, but should be. Because of the small sample size, the probability of this association happening as a result of error is approximately 72%. Propensity for Type II error with this association is high. This association, which is negative, is interpreted as a very weak magnitude of correlation (Evans, 1996), and is not statistically different from 0. Thus, the null hypothesis that the correlation is 0 was not rejected at the .05 level of significance.

H3D: Association between OLEI items and social motivation "Basic Student Needs Scale - Belonging" (BSNS-B)

A Pearson's r correlation coefficient was computed to determine if there is a relationship between 68 participants' OLEI mean scores for items 8 and 13 and Basic Student Needs Scale – Belonging subscale (BSNS-B). Associations were considered significant p < .05. The null hypothesis was that the relationship would be 0. There was a weak, positive correlation between OLEI items 8 and 13 and BSNS-B, r (66) = -.32*, p < .05.

This weak, positive association contributes to the validity evidence of the OLEI. OLEI items 8 and 13 ('meet new people' and 'improve my English skills') are associated with social motivation as measured by the Basic Student Needs Scale-Belonging subscale. Social motivation happens when an actor seeks to engage in a behavior for the pleasure they experience while enjoying social interactions and activities with others which are associated with the behavior. 'Social motivation is evident in a person connecting with other people. Many human motivations are social in nature. Relatedness as a social construct describes an individual's level of connection with other individuals in a social context. Whereas 'belonging' describes an individual's level of connection to the organizations or structures within a social context.

This very weak, negative association suggests that the OLEI and the Social motivation as measured by the BSNS-R are very weakly related. This association provides a more modest contribution to the validity evidence of the OLEI. OLEI items 8 and 13 are weakly, negatively associated with the desire to socialize.

This association, which is negative, is interpreted as a weak magnitude of correlation (Evans, 1996), and is statistically different from 0. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance. This result implies that as someone's social motivation score from the OLEI (items 8 & 13) decreases, their social regulation score from the BSNS-R weakly increases, or vice versa. As one value increases, the other decreases. Despite the characterization of the association as weak, the correlation was statistically different from 0.

GPower reported that this association has β error value of 1- .75, or 25%. A Type II error occurs when a null hypothesis is not rejected, but should be. Because of the small sample size, the probability of this association happening as a result of error is approximately 25%. Propensity for Type II error with this association is moderate.

H4: Association between averaged OLEI items and "amotivation"

The Amotivation Subscale measures potential feelings of a lack of motivation for academic study. The Amotivation Subscale functions alongside the measures of intrinsic, extrinsic, and social motivations. Chapter Two excavated the Self-Determination Theory. One facet of SDT is that intrinsic motivation tends to be the most intense, sincere, efficacious, and most long-lasting form of motivation. Because motivation in our model exists along a continuum with amotivation closer to extrinsic motivation, extrinsic motivation is motivation that hasn't slipped into becoming amotivation yet. This concept is explored more in Chapter Five, Discussion.

A Pearson's r correlation coefficient was computed to determine if there is a relationship between OLEI items mean scores previously averaged to produce the scores used in Research Questions One, Two, and Three and a subscale from the Academic

Motivation Scale – Amotivation (AMO). The tests were conducted using an Alpha$_2$ = .05. The null hypothesis was that the relationship would be 0.

RQ1B and AMO. The ten previously constructed OLEI averages were correlated with the AMS subscale for *Amotivation* (AMO). For brevity, the results are summarized in Table 4.8 below. Three significant associations are described in narrative detail in this section. These three associations are representative of their class of associations (intrinsic, extrinsic, or social). Other associations from those three groupings performed similarly in this study. The Pearson's r correlation for RQ1B of OLEI items 2, 3, 4, 6, 10, and 11 (mean score used in hypothesis 1B) and AMO was .32, which is positive, weak magnitude of correlation (Evans, 1996), and is statistically different from 0, r (66) = .32, p < .05. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance. This result implies that as someone's score of OLEI items thought to represent extrinsic motivation increases, that amotivation also increases. MOOC drop-out has been extensively discussed, but much of that discussion has centered around the absence of data. Researchers implied amotivation because the students dropped out. Other inferences can be drawn from the results and are discussed in Chapter Five, Discussion.

There is a weak, positive correlation between OLEI items 2, 3, 4, 6, 10, and 11 and AMO. GPower reports that this association has β error value of 1 - .75. Because of the small sample size, the probability of this association happening as a result of error is (1 - .75 = .25) or 25%. Propensity for Type II error with this association moderate. Statistical power of .75 is just below the recommended .80 level. Again, a Type II error

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occurs when the null hypothesis is not rejected, but should be. Two other values from these correlations merit narration.

RQ2A and AMO. The Pearson's r correlation for RQ2A of OLEI items 1, 5, and 7 (mean score used in hypothesis 2A) and AMO was .13, which is a positive, very weak association (Evans, 1996). The association was not found to be significantly different from 0, $r(66) = .13$, $p = .28$. Thus, the null hypothesis that the correlation is 0 was not rejected at the .05 level of significance. This result implies that as someone's score of OLEI items representing intrinsic motivation increases, that amotivation increases. In short, participants who demonstrated intrinsic motivations (e.g. to know, to accomplish, and to experience) did not reply with responses associated with amotivation. Intrinsic motivation seems to insulate students from amotivation in MOOCs. These results are consistent with the motivation continuum described in Chapter Two and are more extensively narrated in Chapter Five. The last amotivation result that merits narration involves the association between social motivation and amotivation.

RQ3A and AMO. Research Question Three compared sample means from the OLEI with subscales scores from measures of social motivation. The correlation coefficient between OLEI items 8, 12, and 13 and AMO was .40**, which is positive, is interpreted as a moderate magnitude of correlation (Evans, 1996), and is statistically different from 0, $r(66) = .40$**, $p < .05$. Thus, the null hypothesis that the correlation is 0 was rejected at the .05 level of significance. This result suggests that as someone's scores on social motivation items on the OLEI (8, 12, & 13) increased, that the person's scores on AMS – Amotivation also increased in a moderate linear relationship. There is a moderate, positive correlation between OLEI items 8, 12, and 13 and AMO.

GPower reports that this association has β error value of 1- .94. Despite the small sample size, the probability of this association happening as an error is (1 - .94 = .06) or 6%. Propensity for Type II error with this association low. Again, a Type II error occurs when the null hypothesis is not rejected, but should be. This result suggests that if people signed up to "meet new people", "take the class with colleagues/friends", or "practice English" that they also contemporaneously reported that they were starting to become "amotivated", possibly even "bored".

Table 4.8

Pearson's r Correlation Coefficients for Amotivation items and OLEI Averages

Research Question	Hypothesis	Type of Motivation	Source of DV	Pearson's r	P Value	Significance Level
RQ1	H1A	Extrinsic – Identified Regulation	OLEI: 2, 3, 4, 6	.28*	0.023	p < .05
RQ1	H1B	Extrinsic – Introjected Regulation	OLEI: 2, 3, 4, 6, 10, 11	.32*	0.011	p < .05
RQ1	H1C	Extrinsic – External Regulation	OLEI: 2, 3, 4, 10	.29*	0.016	p < .05
RQ2	H2A	Intrinsic –To Know	OLEI: 1, 5, 7	0.13	0.280	p < .05
RQ2	H2B	Intrinsic – To Accomplish	OLEI: 5 & 10	0.17	0.168	p < .05
RQ2	H2C	Intrinsic – To Experience	OLEI: 7 & 9	-0.05	0.684	p < .05
RQ3	H3A	Social –To collaborate with tech	OLEI: 8, 12, 13	.40**	0.001	p < .05
RQ3	H3B	Social –To relate	OLEI: 8, 12, 13	.38**	0.001	p < .05
RQ3	H3C	Social – To belong	OLEI: 8 & 12	.35**	0.004	p < .05
RQ3	H3D	Social – To belong	OLEI: 8 & 13	.36**	0.003	p < .05

Notes: *. Correlation is significant at the .05 level (2-tailed). **. Correlation is significant at the .01 level (2-tailed). Correlation coefficients strong enough to reject the null hypothesis are bolded.

These results and potential implications for researchers, MOOC instructors, scholars, and administration are discussed in Chapter Five.

CHAPTER V

SUMMARY AND DISCUSSION

Online learning continues to offer convenience, predictability, and opportunity.

Increasingly, learners with all sorts of goals and motivations are using online education to

advance their knowledge, learning, and credentials. As online learning becomes more

commonplace in global higher education, motivation in MOOCs has more salience to

students, educators, and administrators. In this study, survey research methods were

applied to the Online Learning Enrollment Intentions Scale (OLEI) (Kizilcec &

Schneider, 2015, OLEI). This study measured the criterion validity of the OLEI by

correlating average user response scores on the OLEI to existing measures of academic

motivation. This study contributes to the validity evidence of the OLEI. The OLEI

inventories the motivations that prompted online learners to enroll in MOOCs. The need

for normed and validated measures of MOOC motivation is pronounced (de Barba,

Kennedy & Ainley, 2016). Despite the demonstrated need, the OLEI is not widely used

in studies of MOOC motivation. The instruments used in this study are the OLEI Scale,

Academic Motivation Scale (AMS) (Vallerand, Pelletier, Blais, Briere, Senecal, &

Vallieres, 1992), the Motivation in Relation to Self-Directed Learning and Collaborative

Learning Scale – Collaborative Learning with Information Computer Technology Subscale (Choy, Deng, Chia, Koh, & Tsai, 2016), and the Basic Student Needs Survey – Relatedness and Belonging Subscales (Betoret & Artiga, 2011).

This final chapter of the dissertation begins by (1) restating the research problem and (2) reviewing the methods used to collect and analyze the data gathered for this study. The remaining three major sections of Chapter Five (3) summarizes the findings and (4) discusses and situates the findings in relationship to previous studies, including potential implications for theory, research, and practice for each of the four research questions. In the final section, (5) delimitations are acknowledged.

Motivation in MOOCs

If MOOCs are to serve more effectively the diverse needs of online learners, educational researchers and MOOC providers need a richer understanding of what motivates MOOC enrollment. MOOCs offer tremendous potential to liberate learning through the use of personalized learning pathways, learning analytics, and networking opportunities. Based on students' answers to a few questions, course pathways, content, assessments, and opportunities to engage and connect with others could be tailored to fit the individual needs of MOOC learners. Further, significant variation in the enrollment and persistence motivation of MOOC learners has been observed (Houng & Hew, 2016; Kizilcec & Schneider, 2015; Reich, 2014). As such, educational researchers developed the Online Learning Enrollment Intentions Scale (OLEI). The OLEI has been tested for concurrent validity with existing measures of self-regulated learning (Kizilcec et al., 2017). Although self-regulated learning is a significant portion of overall motivation, other factors impact levels of motivation (Deci, & Ryan, 2017). Self-regulated learning

describes how learners begin the process of internalizing external motivators (Ryan & Deci, 2000). Self-regulated learning only involves fully integrated extrinsic motivation and does not include many forms of intrinsic motivation that appear to be present in the OLEI. Consequently, the OLEI should be correlated with motivation instruments that examine intrinsic, non-integrated extrinsic motivation, and/or social or collaborative learning. As explained in Chapter Two, this study examined the Online Learning Enrollment Intentions Scale (OLEI) to determine if average mean scores on OLEI items were associated with existing measures of intrinsic, extrinsic, social motivations, and amotivation.

Methods Reviewed

The methods used in this study relied on statistical association. Similar OLEI items were grouped together to produce average scores. Those average scores were associated with seven existing sub-scales measuring intrinsic, extrinsic, and amotivation from the Academic Motivation Scale (Vallerand et al., 1992). Social learning-oriented OLEI items were associated with existing sub-scales from the Motivation in Relation to Self-Directed Learning and Collaborative Learning Scale – Collaborative Learning with Information Computer Technology Subscale (Choy et al., 2016), and the Basic Student Needs Survey – Relatedness and Belonging Subscales (Betoret & Artiga, 2011). These subscales were associated using Pearson's Product Moment correlation (r). Results were considered significant at the $p < .05$ level, $n - 2 = 66$. One-hundred and sixteen respondents interacted with the survey instruments in Qualtrics. Forty-eight participants were eliminated due to incomplete responses. Sixty-eight participants provided complete

answers to all items. The complete results are presented in Chapter Four. Table 5.1

summarizes the results of the associations for each research question.

Summary of Results

The results for the study are presented in greater detail in Chapter Four. Tthe

results are summarized briefly in Table 5.1 below. Rows 1 through 6 of Table 5.1 display

the correlations between OLEI and AMS items that measure extrinsic and intrinsic

motivations. Rows 7 through 10 display the correlations between averaged OLEI items

and three subscales used to operationalize social learning. Rows 11 through 20 display

the results of correlations between OLEI averaged items and Academic Motivation Scale

– Amotivation subscale. Discussion, interpretation, and connections to previous studies

are the focus of the sections that follow Table 5.1.

Table 5.1

Summary of Associations

Row	Research Question	OLEI Items	Self-Determination Theory Motivational Type	Scale or Subscale	Correlation Coefficient r (n - 2)	Strength & Direction of Association
1	RQ1A	2, 3, 4, & 6	Extrinsic	AMS - Identified Regulation (EMIDR)	**r (66) = .64****	Strong Positive
2	RQ1B	2, 3, 4, 6, 10 & 11	Extrinsic	AMS - Introjected Regulation (EMINR)	**r (66) = .39****	Weak Positive
3	RQ1C	2, 3, 4, & 10	Extrinsic	AMS - External Regulation (EMER)	**r (66) = .60****	Strong Positive
4	RQ2A	1, 5, 7	Intrinsic	AMS - To Know (IMTK)	**r (66) = .37****	Weak Positive
5	RQ2B	5 & 10	Intrinsic	AMS - To Accomplish (IMTA)	r (66) = .23	Weak Positive

6	RQ2C	7 & 9	Intrinsic	AMS - To Experience (IMTE)	r (66) = .14	Very Weak Positive
7	RQ3A	8, 12, 13	Social	Collaborative Learning with Information Computer Technology (SMCL)	r (66) = .16	Very Weak Positive
8	RQ3B	12 & 13	Social	Basic Student Needs Scale – Relatedness (SMR)	r (66) = -.17	Very Weak Negative
9	RQ3C	8 & 12	Social	Basic Student Needs Scale – Belonging SMB	r (66) = -.17	Very Weak Negative
10	RQ3D	8 & 13	Social	Basic Student Needs Scale – Belonging SMB	**r (66) = -.32****	Weak Negative
11	RQ4A	2, 3, 4, & 6	Extrinsic	AMS - Amotivation	**r (66) = .28***	Weak Positive
12	RQ4B	2, 3, 4, 6, 10 & 11	Extrinsic	AMS - Amotivation	**r (66) = .31***	Weak Positive
13	RQ4C	2, 3, 4, & 10	Amotivation	AMS - Amotivation	**r (66) = .29***	Weak Positive
14	RQ4D	1, 5, 7	Intrinsic	AMS - Amotivation	r (66) = -.13	Very Weak Positive
15	RQ4E	5 & 10	Intrinsic	AMS - Amotivation	r (66) = .17	Very Weak Positive
16	RQ4F	7 & 9	Intrinsic	AMS - Amotivation	r (66) = -.05	Very Weak Negative
17	RQ4G	8, 12, 13	Social	AMS - Amotivation	**r (66) = .40****	Moderate Positive
18	RQ4H	12 & 13	Social	AMS - Amotivation	**r (66) = .38****	Weak Positive
19	RQ4I	8 & 12	Social	AMS - Amotivation	**r (66) = .35****	Weak Positive
20	RQ4J	8 & 13	Social	AMS - Amotivation	**r (66) = .36****	Weak Positive

Notes: Associations greater than .29 are shown in boldface. "Strength of Association"

were argued as appropriate for behavioral sciences as per Evans (1996).* Correlation is

significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Discussion, Interpretation and Connection of Findings to Previous Studies

The results summarized in the previous section are related to and are situated among the results from previously reported studies about MOOC motivation, MOOC enrollment intention, Self-Determination Theory and online learning. This section situates each of the 20 associations reported in the previous section into the current literature of MOOCs and motivation. This section is organized broadly around research questions and specifically around the hypotheses tested in this study.

Research Question One: OLEI criterion validity with extrinsic motivation

The three hypotheses tested in Research Question One encompass extrinsic motivation. These extrinsic motivational states are described by Deci and Ryan (2017) as moved by external factors. Extrinsic motivators include things like punishments and rewards, compulsions, guilt, contingent self-esteem, delayed gratification for future rewards, and instrumental actions we take to accomplish other goals. Extrinsic motivation involves motivators that exist outside of the agent of action. All three hypotheses under Research Question One demonstrate statistically significant associations with correlations that are considered strong or weak and positive. Overall, substantial support for Research Question One was present in the sample.

H1A. The results of this correlation demonstrated a strong, positive association between extrinsic motivation-oriented OLEI items 2, 3, 4 & 6 (e.g. "taking the course for 'job', 'degree', 'academic research', or 'career change'") and the AMS subscale for Identified regulation (e.g. "Why do you go to college?" 'help me prepare for the career I

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have chosen', 'enable me to enter the job market in field that I like', 'help me make a better choice regarding my career orientation', 'improve my competence as a worker'). Results were r (66) =.64**, p < .05.

From a semantic perspective, these items all seemed to focus on future rewards and the possibility to use education or the course to change future reward systems and affiliations. Interestingly, adding additional items to this core group of items, as was done H1B and H1C, did not result in a more robust association. In fact, this association was the strongest of all the associations reported in this study. Indeed, the potential relatedness of these items was a strong factor in the decision to associate these items in this study.

Previous validity studies examining the motivation in MOOCs that administered the OLEI did not report detailed associations with self-regulated learning, but did study the OLEI at the same time they studied SRL constructs. Motivation literature regards self-regulated learning as both extrinsic and intrinsic (Pintrich, 2000). Because both constructs are at work within many of the established scales used to measure SRL, the positive association with extrinsic motivation in the current study is not surprising. Contrarily, the more learning is motivated by intrinsic motivations, the more likely it is the student will persist and engage in additional tasks on a path to matriculation. However, Maldonado, et al. (2017) seem to have discovered contrary findings, with high levels of extrinsic items correlating more closely with the measures of SRL like "Task Value" and "Goal Orientation" chosen for their study. In Maldonado, et. al's (2017) OLIE SRL study, items focused on 'job' #2 and 'career change' #6 were associated with higher SRL scores. Maldonado's team also found that intrinsic items #1, #5, and #7 were positively associated with lower SRL scores. The relationship between different types

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and levels of enrollment intention motivation and durable course motivations remains opaque. SRL seems to look at motivation from a variety of perspectives that problematizes validation of the OLEI with metrics built on SRL. These limitations are argued in the remainder of this section.

Previous attempts to correlate the OLEI with items to further demonstrate its motivational properties or to further elucidate its factor structures have predominantly focused on self-regulated learning (Kizilcec et. al, 2016; Kizilcec, et. al, 2017; Maldanado et. al, 2017). Identified regulation is regarded as extrinsic - controlled behavior. While Self-Determination Theory considers identified regulation as the most "fully integrated" (almost intrinsic) type of external regulation, because identified regulation is still based on motivators outside the self, identified regulation is still external. As such, the results of this research question contribute to current understanding of MOOC motivation and lend credence to the notion that measures of student motivation based on self-determination theory are associated with items on the OLEI. The research finding regarding H1A makes a strong argument that measurable levels of identified regulated extrinsic motivation can be effectively parsed from individual or aggregated answers to items on the OLEI.

Further, this association seems to demonstrate that OLEI items 2, 3, 4 & 6 are highly related and demonstrate higher levels of internal consistency when grouped together. When pooled together and averaged, these four variables improved their internal consistency scores as measured by Cronbach Alpha from .703 (whole test) to .849 (pooled items). This finding further illustrates the relatedness of these items. The increase in the strength of the Cronbach Alpha scores demonstrates that these items when

pooled together reasonably measure extrinsic, identified regulatory motivation as measured on the AMS.

Taken together these four items might hint at the presence of a 'Future Time Orientation' perspective as articulated by de Bilde et al., (2011). In their study, they examined the connections between measures of Self-Regulated Learning strategies, future tense orientations, self-determination theory, and attitudes towards attending college with Scandinavian high school and young college students. In this study, self-efficacy, autonomy, and task value were examined to see if a future tense time perspective impacted how learners felt about or performed in college. The de Bilde team's (2011) results suggest that the connection between SRL and SDT may be temporal. Students who expressed a future time orientation expressed higher levels of autonomy and self-efficacy. de Bilde et al.'s findings seem to bolster the current discussion of the current results. de Bilde's group examined 275 high school and college students in Scandinavia and uncovered strong associations between items measuring future tense orientations and strong levels of introjected (guilt and shame), identified regulation (personal conviction), and intrinsic (interest) motivations. Seemingly, when humans are motivated based on a future-oriented punishments or rewards the motivational taxonomy and constructs from SDT appear better situated to describe and measure the presence of specific types of motivations. SRL fails to adequately inventory why learners learn. SRL is excellent for examining the strategies that learners use to advance their learning, but SDT inventories why those motivations result in specific behaviors at a much more granular level. Potentially, this higher level of granularity will advance the project of personalized learning within MOOCs.

Indeed, only a handful of studies even quote Zimmerman, Pintrich, and Deci & Ryan in the same literature review. The fact that the Scandinavian study does and seems to involve these critical components of time orientation adds additional nuance and potential complexity to the prospect of creating personal learning pathways. Kizilcec and Schneider (2015) reported that the OLEI was resistant to further component reduction. They reported 'vocational' and 'academic research' as irreducible components. While that may be true of OLEI data collected on binary measures, the end goal of personalized learning may require tense differentiation in the OLEI items into future and present 'vocational' and 'academic' goals. Arguably, the OLEI presents an adequate format for the situational measurement of these variables. The proposal of additional items and the testing of those items is beyond the scope of this research effort.

Relatedly, Pintrich, Smith, Garcia, and McKeatchie, (1993) described future orientations of the utility of information under the construct and subscale of "Task Value." in the MSLQ and the scoring instructions. The MSLQ is one of the most established SRL measures. Situationally, if a learner understands that the knowledge may be useful in a future context, the learner is often able to foreground that part of their perception. Foregrounding future orientations helps learners to regulate their own emotional state to continue to engage in what otherwise might be considered a 'boring' activity. Task Value and the temporally situated nature of motivation constructs within most SRL reports is another argument in favor of the using SDT motivation framework in the context of initial MOOC enrollment motivation and situational longitudinal motivation inquiries. SRL as a theory is more well-suited to evaluate how students think about material rather than what motivated them to enroll in a course. The specific flavor

of MOOC enrollment motivation is the critical first step that moved a student to enroll. SRL is a construct that evaluates how students use strategies and coping mechanisms to navigate learning opportunities and create knowledge. Conversely, SDT is less concerned with specific strategies than with the 'why'. SRL is more concerned with 'how'. SDT is more concerned with 'why'.

Task value in SRL constructs encourages students to reflect on how an individual portion of a class affects motivation. SDT can accurately reflect how task value applies to the broader course as a whole, rather than specific situationally bound snapshots of motivation that are applicable to specific assignments and tasks. SRL focuses on these details. To more accurately measure the situational motivational context, multiple measure longitudinal studies are required, possibly with measures like the Guay, Vallerand, and Blanchard's Situational Motivation Scale (2000). This measure is temporally bound in the present tense and uses more clear verbs. Additionally, the subscales and how the Situational Motivation Scale address intrinsic motivation may be more closely aligned to the OLEI than the AMS was in this study. The emphasis on present tense time orientations in the SDT and the confusing nature of multiple possible temporalities in many SRL items may be an argument in favor of using metrics to measure enrollment motivation based on Self-Determination Theory items.

H1B. The results of this correlation demonstrated a weak positive association between extrinsic motivation-oriented OLEI items 2, 3, 4, 6, 10 & 11 (e.g. "taking the course for 'job', 'degree', 'academic research', 'career change', 'earn certificate', or 'course offered by prestigious university/professor) and the AMS subscale for introjected regulation (e.g. "Why do you go to college?" 'to prove to myself I am capable of

completing my college degree', 'because when I succeed in college I feel important', 'to show myself that I am an intelligent person', 'because I want to show myself that I can succeed in my studies'). Results were r (66) =.39**, p < .05. Introjected regulation involves compulsion, contingent self-esteem, guilt, shame, and fear of disapproval as primary motivational constructs. Hence, the additions of OLEI items #10 & #11, "Earn a certificate of accomplishment" & "Course offered by prestigious university or professor" to the core group of extrinsic items averaged from the previous group. These two items are added because they are both concerned with the external validation of learning and contingent self-esteem and contingent affiliation-based identity-delayed rewards.

Neither of these two items from the OLEI have a clear connection to future tense orientations or future tense goals. 'Earning a certificate' from an institution at which you are not currently or formally enrolled in credit bearing courses and/or taking the course 'because it is offered at a prestigious institution' or with a 'prestigious faculty' member are both arguably exercises in contingent self-esteem and affiliated, identification regulatory mechanisms. The AMS items clearly deal with contingent self-esteem and "proving" academic readiness to yourself. Two ways to prove that readiness would be earning a certificate in a challenging course or taking a class from a prestigious institution or well-known professor.

The weak association is statistically different from zero. The result suggests that a few items from the OLEI again accurately reflect a continuum of motivational states from highly motivated intrinsic motivation through less robust external regulation, all the way to non-existent amotivation. OLEI item #10 involves the earning of a certificate of accomplishment. This continuum includes Introjected regulation. The OLEI appears to

tap into these constructs when items are pooled as recommend here. While item #10 may appear to be more associated with traditional "external regulation" removing it from the variable did not result in a stronger association. In fact, removal of "earn a certificate" decreased the strength of association from .39 to .375. Introjected regulation is still considered somewhat extrinsic by SDT theorists (Deci & Ryan, 2017). The current finding demonstrates that SDT is a useful prism for examining MOOC enrollment motivation. Because this finding is based on six of the thirteen closed OLEI items, it is safe to assert that nearly half of the items in the OLEI are measuring extrinsic motivation constructs. While the weak association does support the presence of SDT motivational structures within the OLEI, the strength of the association is weak and there may not be enough "emotional' terms implying obligation in the OLEI terms. Additional testing of the validity evidence with additional measures may help clarify this relationship.

     H1C. The results of this correlation demonstrated a strong positive association between extrinsic motivation-oriented OLEI items 2, 3, 4, 6, 10 (e.g. "taking the course for 'job', 'degree', 'academic research', 'career change' and 'earn a certificate') and the AMS subscale for external regulation (e.g. "Why do you go to college?" 'find a high-paying job later', 'to obtain a more prestigious job later', 'to have the good life later', 'in order to have a better salary later'). Results were $r(66) = .60^{**}$, $p < .05$. Semantically, these items all seemed to focus on future career rewards like prestige, higher pay, living the good-life, better salary, or a career in the future, the operative word being "later" in these items. The OLEI average scores and the external regulation items were strongly and positively associated with one another.

The strength of this association was the second strongest association reported in this study. Interestingly, the association was not made stronger by looking at OLEI item #10 (earn a certificate) in isolation. When item #10 was correlated with AMS external regulation subscale as a stand-alone item the strength of the association decreased from .60** to .38**. While this result used Pearson's r to associate OLEI #10, this is a circumstance where Kendall's Tau-B is more appropriate. Remember, in Chapter Three Pearson's R was decomposed as the appropriate analysis procedure for at least interval by interval data. Averaging OLEI items together into a pooled factor, allows this study to employ Pearson's r as the primary method of analysis; however, when an individual dichotomous, binary, nominal variable is associated with an interval scale, Kendall's Tau is the more appropriate statistical test, ((Nolan & Heinzen, 2012; Nussbaum, 2015; Xu, et al., 2013). OLEI item #10 associated with the AMS-EMER external regulation subscale resulted in a less robust association, K_T (66) =.32**, p < .05

Pooling items #6 & #10, and excluding #2, #3, & #4 also failed to produce a more robust association. Several permutations of OLEI associations were attempted. Only one possible association of the extrinsically-oriented OLEI variables resulted in a more robust association. Only the combination of OLEI items #3, #4, #6, #10 & #11 resulted in a more robust association with EMER. That association omitted #2 (relevance to job) and resulted in a .65 correlation coefficient. Interestingly, it appears as though the strength of association was bolstered by the presence of other underlying extrinsic motivational items or constructs. These results suggest that pooling of identified and introjection regulated items increases the potency of the association with external regulation in the context of MOOCs and the OLEI. These findings merit additional study to determine the

exact relationship between "rewards and punishments" and extrinsically-oriented items on the OLEI. Perhaps, the collection of responses from students who are enrolled in credit-bearing arrangements or actual academic programs on MOOC platforms would better inform the structure of these associations? Coursera's signature track students or students who are in credit bearing arrangements with some of Coursera's partner institutions would be an ideal population to sample in such a study.

Perhaps a more applicable version of the AMS that assumed an online or MOOC context would further elucidate the workings of extrinsic motivational types within the OLEI and MOOCs in general? Items #2 & #6 are both employment related. #2 deals with immediate learning needs imposed on the learner by their job. Item #6 deals to future employment needs and the desire to change careers/jobs in the future. Additional insights about how a present versus future orientation time orientation might affect student motivation in MOOCs is a topic worthy of additional investigation. The next sections summarizes the potential implications of theory, research, and practice as they relate to Research Question One.

Implications for theory, research, and practice for Research Question One

The presence of extrinsic motivations is important within the context of Self-Determination Theory. Strong and weak associations with multiple components of Self-Determination Theory demonstrate the usefulness of applying motivation constructs from Self-Determination Theory to MOOCs. Further, associations with the OLEI and items built on Self-Determination Theory demonstrates that the OLEI may be a much more useful metric for supporting personalized learning than previously has been considered. Researchers (Salmon et. al, 2017) have called upon MOOC practitioners and MOOC

providers to make good on the promise of MOOCs by providing personalized instruction based on a course goals or a learning profile constructed prior to the commencement of the course. A more robust understanding of short motivational metrics that can be completed in seconds is a vital first step to constructing personalized learning paths (de Barba et. al, 2016). The RQ One findings establish a firm basis for OLEI items being strongly associated with a well-established measure of extrinsic motivation.

Table 5.2

Implications for Theory, Research, and Practice for Research Question One:

1)	Motivation measures built on SDT appear to be better suited than SRL for understanding MOOC learner enrollment intention and situational motivation.
2)	Researchers should encourage course managers to deploy the OLEI in all MOOCs on all platforms and collect motivation data from students longitudinally in MOOCs.
3)	Future tense time orientation motivational encouragement may help encourage learners who need to foreground more potent motivational fuel.
4)	Individuals who are taking the class to be associated with prestigious instructors or institutions are motivated by 'proving' their academic worth. Motivational messaging that encourages students to 'rise the challenge' or to 'demonstrate competency' might result in higher levels of motivation for MOOC learners.
5)	External regulation is a powerful force in MOOC enrollment intention. Greater study of students who are seeking a certificate of completion in Coursera's Signature Track or other credit bearing arrangements would help to further explain how external regulation moderates MOOC motivation.

As MOOC observers and researchers continue to unpack the learning that is happening in these courses, Self-Determination Theory is an appropriate prism from which to examine MOOC motivations. The findings for Research Question One show strong or weak, positive associations with all three types of extrinsic motivation measured by the SDT: identified regulation, introjected regulation, and external regulation. These findings suggest that OLEI items #2, #3, #4, #6, #10, #11 are potentially less-nuanced metrics that accomplish in six items what the AMS does in twelve items. While this finding may appear somewhat banal, it is a direct answer to researchers like Yang (2017), who encouraged researchers to test the AMS in online learning contexts. These findings also further extend the conversation about motivation in MOOCs by attempting to norm and validate a smaller measure of MOOC motivation with established metrics of academic motivation.

Finally, if MOOCs are to offer personalized learning plans based on course goals of the learner, which according to some MOOC researchers and enthusiasts is the final destination of the MOOC learning experience (de Barba, et al., 2016; Kizilcec & Schneider, 2015; Salmon et al., 2017), then among the first steps must be a connection to established measures of extrinsic motivation. By establishing strong and weak associations between OLEI items and extrinsic motivational measures, the present study makes a contribution to the validity evidence of the OLEI. The short OLEI items may be able to measure motivation accurately enough to create course paths for learners based on the presence of extrinsic motivation and the interplay with future time perspective. This finding lends insight into how to use the OLEI in the future. The OLEI might be modified to allow learners to choose between present and future tense learning temporal

perspectives. These different temporally differentiated motivational states may have different antecedents, multipliers, or detractors. The primary recommendations for Research Question One are summarized in Table 5.2 above.

Research Question Two: OLEI criterion validity with intrinsic motivation

The three hypotheses tested in Research Question Two encompass intrinsic motivation. Intrinsic motivational states are described by Deci and Ryan (2017) as being moved by internal factors. Intrinsic motivators include things like pure interest, curiosity, challenge, and enjoyment. Intrinsic motivation involves motivators that exist inside of the agent of action. These types of motivators can also include things like fun, pleasure, personal growth, competition with yourself, gratification we feel for experiencing/learning new things. Only one of the three hypotheses under Research Question Two demonstrated statistically significant associations with correlations that were considered strong or weak. Overall, Research Question Two was partially supported and partially not supported.

H2A. The results of this correlation demonstrated a weak positive association between intrinsic motivation-oriented OLEI items 1, 5, & 7 (e.g. 'taking the course for 'general interest', 'personal growth', or 'fun and challenge') and the AMS subscale for intrinsic motivation by the desire "to know". (e.g. "Why do you go to college?" 'because "I experience pleasure and satisfaction while learning new things', 'pleasure I experience when I discover new things never seen before', 'pleasure that I experience in broadening my knowledge about subjects which appeal to me.', 'Because my studies allow me to continue to learn about many things that interest me.'). Results were $r(66) = .37^{**}$, $p < .05$. From a semantic perspective, these items all seemed to focus on satisfaction from

learning new things, general interest in the topic, and broadening knowledge. Previous OLEI validity studies examining the OLEI have concluded that these items (intrinsic motivations centered around OLEI enrollment intentions that signal 'general interest' or 'personal growth') were less strongly associated with higher scores of self-reported SRL (self-regulated learning) (Kizilcec, et al., 2017). The current findings seem to indicate that lower scores of self-regulated learning maybe related to less desire to regulate learning. Indeed, intrinsically motivated MOOC learners may be not have a meaningful reason to regulate their learning. Because they are interested in the subject or interested in the fun or the challenge of interacting with the course content, those learners may be disinterested in regulating their learning. They may instead be engaged in 'present tense hedonism'.

Psychology literature refers to this phenomenon within the context of 'future time orientation' motivation studies (de Bilde, et al., 2011). Individuals who are seeking 'fun', 'interest', or 'personal growth' may consider those motivations to be so self-indulgent, that they may be incapable of applying any type of regulatory mindset to course absent a credit-bearing or gamified container.

The weak positive association for H2A indicates that items on the OLEI are associated with measures of intrinsic motivation as operationalized by the 'to know' subscale of the AMS. Individuals with high levels of intrinsic motivation may see the MOOC as a different learning landscape. Some of these learners may be 'drop-in' learners. Some may be looking for specific information to fill-in-gaps in their knowledge. Some learners may be engaging in learning hedonism and may be more motivated to explore the content on their own without significant interaction with formal course

activities. These types of learners maybe more easily discovered through click-analytics and 'mortality' studies than self-reports. Many studies have described these learners as 'drop-ins' or with other terms of art (Kizilcec et al., 2013; Kolowich, 2014; Reich 2015; Wilkowski et al., 2014)

H2B. The results of this association were considered weak and positive. The strength of this association was not considered robust enough to reject the null hypothesis. This association correlated OLEI items #5 & # 10 e.g. "taking the course for", 'personal growth' or to 'earn a certificate of accomplishment' with items from the AMS subscale for intrinsic motivation with items such as "to experience" (e.g. "Why do you go to college?" for the 'pleasure I experience while surpassing myself in my studies', 'pleasure that I experience while I am surpassing myself in one of my personal accomplishments', 'satisfaction I feel when I am in the process of accomplishing difficult academic activities', 'because college allows me to experience a personal satisfaction in my quest for excellence in my studies'). Results were r (66) =.23, p < .05.

From a semantic perspective, these items all seem to focus on the accomplishment that a student feels when finishing an assignment or a course or a degree. The only OLEI items that appear similar focus on earning a certificate or accomplishing some type of growth. Interestingly, including neither item #5 nor #10 resulted in a stronger association. When Pearson's r was used to associate all 13 OLEI items individually with the AMS subscale "to accomplish", only two items demonstrated significant associations using Kendall's Tau to associate nominal variables with an interval or scale measure. Those items were for #6 'career change' (r (66) =.26*, p < .05). and #11 'course offered by prestigious university / professor' (r (66) =.28*, p < .05). Kendall's Tau-B returned a

predictably more conservative association. Item #6: K_T (66) = .26, p < .05; Item #9: K_T (66) = .26, p < .05.

The hypothesized model predicted that item #11 would be more closely associated with identified regulation or with aspirations of affiliation and contingent self-approval based on goal striving for contingent self-esteem. When items #6 & # 11 were pooled and associated with IMTA the strength of the association actually slightly decreased, r(66) = .23, p < .05.

In Chapter Two, a delineation was made about two different schools of thought when it comes to intrinsic motivation and SDT. From the uninitiated perspective, Deci & Ryan are notably silent about the tripartite theory of intrinsic motivation offered by the French school of SDT. Researchers like Gagne, Vallerand, and Laithian have posited that intrinsic motivation is composed of three parts: 'to know', 'to experience' and 'to accomplish'. Deci & Ryan have repeatedly offered a finely-granulated take on extrinsic motivation and how social motivation modulates extrinsic motivation. The Rochester school (Deci & Ryan and their acolytes) have consistently operationalized intrinsic motivation as less nuanced and more all-encompassing. At times, Ryan's scholarship suggest that he may also philosophically endorse a paradigm of tripartite IM. Although his shared scholarship with Deci, suggests that support for the tripartite theory of IM may not be unanimous. While these theoretical musings may explain the current results, the current study makes no contribution to settling this controversy. The ongoing debate over the existence of the tripartite theory of intrinsic motivation could additionally contextualizes why hypothesis H2A was supported and why H2B & H2C are not, or are only weekly supported.

H2C. The results of this association were considered weak and positive. The strength of this association was not considered robust enough to reject the null hypothesis. This association correlated OLEI items #7 & # 9 (e.g. "taking the course for", 'fun & challenge' or to 'experience and online course') with items from the AMS subscale for intrinsic motivation by the desire "to experience stimulation" (e.g. "Why do you go to college?" 'for the intense feelings I experience when I am communicating my own ideas to others.', for the pleasure that I experience when I read interesting authors.', 'for the pleasure that I experience when I feel completely absorbed by what certain authors have written.', 'for the "high" feeling that I experience while reading about various interesting subjects.'). Results were r (66) =.14, p < .05.

From a semantic perspective, these items all focus on a sense that education is grounded in a pursuit for experiencing stimulation. Again, the OLEI items both seemed to explore enrollment intentions that speak to a certain level of stimulation seeking that a student might experience when pursuing 'fun' or 'challenge' in learning. Clearly, the previously referenced incongruences of the structure of intrinsic motivation within SDT may be an important limiting factor on the current results. Seemingly, the items in the OLEI may also be inconsistent with the tripartite theory of intrinsic motivation. Items like #1 'personal interest' are closely associated with 'fun' in item #7; however, the concept of 'challenge' appears to be more closely associated with 'accomplishment'. Perhaps OLEI item #7 'fun and challenge', might communicate more information to course designers and professors if it was two items instead of one? That decomposition of the item into two separate constructs might be more consistent with a Vallerand, et. al's

(1992) conceptualization of intrinsic motivation in the AMS. 'Fun' may be distinct from a 'challenge'.

Implications for theory, research, and practice for Research Question Two

On balance, Research Question Two was not as well supported as Research Question One. Of the three hypotheses tested in Research Question Two, only one association produced a correlation considered strong enough to reject the null hypothesis (H2A). These findings still have important implications for MOOC motivation theory, research, and practice.

Self-determination theorists have explored the concept of intrinsic motivation (IM) for decades going back to the 1970's. Some SDT theorist believe that intrinsic motivation is a broad and undifferentiated motivational state. However, other theorist have embraced IM as a tripartite model that includes three distinct types of intrinsic motivation: to know, to accomplish, and to experience stimulation. When intrinsic motivation is combined with drives to achieve an accomplishment or to demonstrate competency, the motivational state is difficult to distinguish from other types of extrinsically driven, goal-oriented motivational states (Carronneau et al., 2011). The current findings seem to suggest that while the OLEI accurately inventories the presence of several motivational states that can confidently be associated with extrinsic motivation, the ability of the OLEI to parse intrinsic motivation in a nuanced way is not as robust. The three intrinsic items that are semantically obvious within the OLEI (#1 'for general interest', #5 'for personal growth and enrichment' and #7 'for fun and challenge' are all associated with the AMS subscale 'to know'. The partially supported association with components of tripartite intrinsic motivation merits additional scrutiny. Support of H2A

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indicates that the OLEI items are intrinsic. However, the lack of additional associations with 'To Accomplish' and 'To Experience' stimulation may be significant. According to Carbonneau, et al. (2011) different types of intrinsic motivation have different antecedents. Further different types of intrinsic motivation have different behavioral outcomes as well. Additional study of the OLEI and the potential addition to or decomposition of OLEI items (especially item #7) may lend additional clarity to intrinsic motivation in MOOC enrollment decisions.

Carbonneau, et. al's (2011) thoughts in the context of the results are additionally interesting when one considers that 'to accomplish' motivation maybe indistinguishable from extrinsic goal seeking motivation. The existing results may support that finding, but the current level of data measurement within the OLEI may not support a meaningful decomposition of the types of IM reported with the OLEI. A different measure of Self-Determination Theory may be more appropriate contribution to the validity evidence of the OLEI.

The Situational Motivation Scale (Guay, Valleranc, and Blanchard, 2000) takes a less nuanced view of intrinsic motivation. While the items triangulate the three different types of IM, only four items for IM makes the measure shorter. Further, the SIMS parses out four constructs of intrinsic, extrinsic, and amotivation that are important for MOOC researchers in only 16 items. Use of the SIMS should increase response rates and make analysis easier by decreasing both the number of constructs and items used. Use of the SIMS also seems appropriate because it integrates vital measures of amotivation into its scales. Further, use of the SIMS seems consistent with the desire to measure motivational states not just prior to or immediately after enrollment, but at several points throughout a

MOOC. Perhaps after an assignment, or after a live chat with the instructor, or after the student receives feedback? Next, the SIMS would require less rewording to assume a MOOC or online context. Also, because the ultimate goal is to find short items that allow researchers to unobtrusively gather data about motivational states, I think that the SIMS is appropriate because it is significantly shorter than just about every metric applied to MOOC motivation at this point. The MSLQ is 81 items. The AMS was 28 items. The MSRL-Q is 41 items. The SIMS could be used for repeated measure, longitudinal study of MOOC motivation. Additionally, the short and modular nature of the SIMS makes it advantageous for the next steps in MOOC research. Depending on the type of support (IM or EM) or the type of behavior demonstrated the SIMS allows researchers to see if

Table 5.3

Implications for Theory, Research, and Practice for Research Question Two:

1) Some students enroll in MOOCs for the shear joy of learning. These types of students maybe animated with message and supports that emphasize how much fun the leaners are having in the MOOC.
2) Lack of support for the AMS intrinsic motivation items may suggest that intrinsic motivation in MOOCs is not a finely granulated as extrinsic motivation.
3) OLIE item #7 'fun and challenge' may need to be decomposed into two items. SDT theory postulates that some intrinsically motivated learners enjoy the 'fun' of learning, but may experience anxiety when challenged by their learning.
4) MOOC researchers should use the Situational Motivational Scale to evaluate motivation longitudinally over time in MOOCs. The SIMS measure may more easily correlate with the OLIE.

their small-scale, support-oriented interventions are having the desired effect on motivation. Because the SIMS has subscales and component parts, some of those motivational supports could be evaluated in as few as four items. Finally, because the SIMS assumes whatever situation a participant finds themselves in, it could be deployed in an eLearning or MOOC context with no additional testing or revision of the items. These quasi-experiments would be similar in execution to the SRL interventions tested by Kizilcec and Halwa (2016). However, instead of SRL these experiments would test encouragement messages and supports build on SDT.

The practical implication of the findings for Research Question Two are limited. Most of the respondents in the sample selected 'applies' to OLEI item #1 (65 out of 68). Most of the respondents in the sample selected 'applies' to OLEI item #5 (65 out of 68). Many of the respondents in the sample selected 'applies' to OLEI item #7 (53 out of 68). Practically, this means that the overwhelming majority of the sample enrolled in the course for 'general interest in the topic' and 'personal growth and enrichment'. While these two items seem to capture most of the IM oriented reasons why students enrolled, these two items may be over-reported within the sample because of the nature of self-reports. Research shows that optional, self-reports tend to attract intrinsically-motivated students who may skew results based on their levels of enthusiasm. Further, as samples get larger, the impact of the effect is diminished. Hence, the smaller sample size of the current study may make the self-reporting of these motivational states more pronounced. Practically, most MOOC respondents who participated in this study reported a high level of personal intrinsic motivation for enrolling in MOOCs.

Research Question Three: OLEI criterion validity with social motivation

The four hypotheses tested in Research Question Three encompassed social motivation. Social motivational states are described by Deci and Ryan (2017) as being moved by the internal need to connect with others. Social motivators have been demonstrated to include things like connecting with students, connecting with teachers, practicing social interactions, and trying to generate a feeling of belonging. Social motivations are driven by desires to connect with others. Only one of the four hypotheses under Research Question Three demonstrated statistically significant associations with correlations that were considered strong or weak. Overall, Research Question Three was partially supported and partially not supported.

H3A. The results of this association were considered very weak and positive. The strength of this association was not considered robust enough to reject the null hypothesis. This association correlated OLEI items #8, # 12, & #13 e.g. (taking the course for", 'meet new people', 'take course with colleagues/friends, or to 'improve my English skills) with items from the Motivation in Relation to Self-Directed Learning and Collaborative Learning Questionnaire – subscale for Collaborative Learning with Technology (CLT). ('In this class, my classmates and I actively share ideas in the online platforms', 'In this class, my classmates and I contribute ideas to each other's work posted on the online platforms', and 'in this class, my classmates and I actively discuss our ideas online to come up with better ideas'). Results were r (66) =.16, p < .05. The results indicated a weak, positive association between social motivations as reported on the OLEI and collaboration with technology. These results did not produce a significant enough interaction to reject the null hypothesis.

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While this subscale appears to accurately measure levels of cooperation with computer technology, the lack of significant association is not necessarily surprising. All of the invitations to participate in the study were posted to discussion boards on Coursera and edX. These two MOOC providers are considered less dialectic and constructivist and more top-down. Further, not many assignments in a MOOC involve group work or active collaboration with colleagues. Hence, the application of this particular subscale may have been suboptimal from the beginning. This measure has a theoretical underpinning in the self-regulated learning work of Zimmerman and Pintrich and is based on the "social learning" subscales of the MSLQ translated into an online context by a team from Singapore.

This very weak association either casts doubt on the fit of the SDT and/or the SRL, or suggests that very little collaboration is happening in MOOCs. Which is it? Do the social learning theories of the SRL not apply to these MOOCs? Does Deci & Ryan's SDT not explain social motivation in MOOCs? Perhaps this result is evidence of the socially impoverished learning currently happening in the MOOCs included in the sample? Determining which of these alternatives is more likely behooves MOOC professors and providers. Perhaps the failure to report satisfaction with online collaboration with technology is a result of stifled SDT needs to belong and relate? Perhaps high attrition rates are the result of this instructional model not this modality?

H3B. The results of this association were considered very weak and negative. The strength of this association was not considered robust enough to reject the null hypothesis. This association correlated OLEI items # 12, & #13 (e.g. "taking the course", 'to take with colleagues/friends', and to 'improve my English skills') with items from the

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Basic Student Needs Scale – Relatedness subscale (e.g. 'The teacher made me feel confident enough so I could ask anything freely', 'I felt that the teacher was friendly and willing to help.', and 'The teacher has been very understanding [puts his/herself in other people's place] about students' problems'). Results were r (66) =- -.17, p < .05.

These results suggest that a negative relationship may exist between declared OLEI MOOC motivation intentions and feelings of 'relatedness'. The subscale used in the current study assumes Self-Determination Theory perspective. The measure seeks to explore emotional connection with the instructor in the course. Given the very weak nature of the association, any conclusion drawn from this data might be suspect. Interestingly, when the metric of Relatedness was associated with all of the 13 OLEI items individually, relatedness was not positively associated with any of the OLEI items. However, Relatedness was negatively associated with one item on the OLEI (#8 Meet new people). While that association was considered weak [r (66) = -.27*, p < .05; K_T (66) = -.28*, p < .05] according to Evans (1996). While the results of H3B are not significant, the results of evaluating relatedness in the context of the OLEI show a potentially weak, negative relationship between the desire to 'meet new people' and feeling 'relatedness 'or 'connected' to the instructional staff of a MOOC. Bottom line: if you signed up to meet new people, including the professors or instructional staff, you already feel isolated immediately following sign-up. Another possible explanation would be that the learners in this sample are experienced xMOOC students. As such, they have been conditioned to expect no contact with the instructional staff through enrollment in scores of MOOCs? Again, that contextualization of this result suggest that social learning in MOOCs is impoverished.

H3C. The results of this association were considered very weak and negative. The strength of this association was not considered robust enough to reject the null hypothesis. This association correlated OLEI items # 8 & #12 (e.g. "taking the course", 'to meet new people' and 'to take with colleagues/friends') with items from the Basic Student Needs Scale – Belonging subscale (e.g. 'There is a strong feeling of friendship in this group/class.', 'Being in this group/class feels like belonging to a large family.', and 'I will remember my classmates from this group/class affectionately in the future'). Results were $r (66) = -.17$, $p < .05$.

The items from the OLEI are social in nature. They cover taking the course to meet people or taking the course with people you already know. Again, while this association does not lend significant insight into why students enroll in MOOCs, some of the associations with the OLEI and the Belonging subscale are intriguing. Belonging has to do with fitting into a group and finding peer to peer socialization. Specifically, belonging was negatively associated with OLEI item #6 'career change' [$r (66) = -.32**$, $p < .05$; $K_T (66) = .26*$, $p < .05$]. Another OLEI item closely negatively associated with 'belonging' was OLEI item #8 'meet new people' [$r (66) = -.26*$, $p < .05$; $K_T (66) = -22*$, $p < .05$] The final significant association between belonging and the OLEI was with OLEI #13 'improve English skills". This association was also negative $r (66) = -27*$, $p < .05$; $K_T (66) = -.22*$, $p < .05$. Pooling all three of these items together (career change, meet new people, and improve English) resulted in a stronger negative correlation $r (66) = -.38**$, $p < .05$ with the *Belonging* subscale.

These results suggest that regardless of motivational type (intrinsic, extrinsic, or social), that learners do not feel like they belong to a group or are a part of a family or

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team in the MOOCs sampled in this study. Indeed, these findings seem to suggest that if students identify 'career change', 'meeting new people' or 'improving their English' skills as factors that influenced their enrollment motivation, then they do not feel like they belong in the class. Because the present sample was collected by posting to the course in the "orientation module" or "questions about the course" module, students should have viewed it early in the course. This weak, almost moderate ($r > .40$), association demonstrates that learners who are trying to change careers, meet people, or practice English that they feel limited connections to others when they enroll. Because ½ of MOOC learners sign-up for the class, visit the course web site once, and do not return (Nazir, Davis, & Harris, 2015). Hence, reaching out to and providing support for socially motivated learners during the first class period is an essential recommendation of this study. MOOC providers and instructors should look at ways to generate belonging upon enrollment or risk learners becoming frustrated, amotivated, and dropping out.

Social motivation has been found to be a potent motivational regulator of behavior. Deci & Ryan (2017) report that social motivation can lend strength to extrinsic motivation. In fact, potent enough social motivation can produce motivational states that are nearly identical to highly motivated intrinsic motivational states. Social motivation allows weaker extrinsic motivation to grow into stronger identified or introjected regulation.

The curious finding about the inverted relationship between a desire for a career change and feeling like you do not belong is interesting to say the least. Individuals pursuing a career change might feel isolated because they lack technical knowledge to fully participate in the course. They may have enrolled hoping that they would find a

coach or a mentor that might help them navigate the career change. They may have enrolled hoping to find a community of like-minded individuals from which to learn and grow. They may be frustrated that the MOOC has not provided them with sufficient opportunities to socialize and find belonging. This finding may suggest that individuals who enroll in a MOOC with an eye to changing their career likely need additional supports, introductions, career counseling, and/or onboarding to feel like they belong.

H3D. The results of this association were considered weak and negative. The strength of this association was robust enough to reject the null hypothesis. This association correlated OLEI items #8 & # 13 (e.g. "taking the course for", ''meet new people and 'improve English skills') with items from the BSNS – Belonging subscale. This is the same social motivation subscale used in the previous hypothesis. Typical items from this subscale included text like, 'There is a strong feeling of friendship in this group/class.', 'Being in this group/class feels like belonging to a large family.', and 'I will remember my classmates from this group/class affectionately in the future'. Results were r (66) = -.32**, p < .05. From a semantic perspective, these items all focus on a sense that enrollment in the MOOC is grounded in the social motivations of meeting people and practicing English skills. These negative associations and the potential unmet needs of MOOC learners are apparent. The current findings suggest that some MOOC learners do not feel like they belong in the course. These learners may have had unrealistic expectations of connection with others in the course, but many individuals who identified social MOOC enrollment motivations, directly report that they are frustrated with their pursuit of those goals.

Implications for theory, research, and practice for Research Question Three

On balance, Research Question Three was not as well supported as Research Question One or Two. Of the four hypotheses tested in Research Question Three, only one association produced a correlation considered strong enough to reject the null hypothesis. These findings still have important implications for MOOC motivation theory, research, and practice.

Self-Determination Theory stresses the importance of social connections in moderating and regulating motivation. Self-Determination Theory explores humanity's dynamic need to feel belonging. We are social creatures. Deci & Ryan (2017) stress that unsatisfied motivational needs lead to states of amotivation. While the results of Research Question Four (the associations between the OLEI and amotivation) have not yet been discussed in this chapter, the results have been reported in Chapter Four and in Table 5.1. Those results show significant associations between OLEI social motivations and levels of amotivation as measured on the AMS subscale. Taken together these results indicate that MOOC students who are socially motivated also experience weak levels of amotivation.

Deci & Ryan argue that high levels of amotivation suggests that learners have needs (autonomy, competence, or relatedness) that are not being adequately met by their educational pursuits. The results of Research Question Three suggest that socially motivated learners are especially vulnerable to attrition on the two MOOC platforms examined in this study. Coursera and edX are reputed to be less constructivist in the production of knowledge than MOOC providers like Future Learn (Rizvi et al., 2020).

From a theoretical perspective the RQ3 results are unsurprising. The level of connection with MOOC professors is wildly variable. Some professors are socially present and employ a platoon of course discussion facilitators and graduate assistants to interact with students. Other MOOCs are run asynchronously and the instructional staff may not even be actively monitoring the frequently asked questions on a regular basis (this phenomenon is especially pronounced with archived courses). MOOC social interaction is not just variable when it comes to interactions with instructors. Some MOOCs involve social media break-out groups. Other MOOC have both planned and spontaneous 'meet-ups' so that individuals can socialize with like-minded students. This study did not target MOOC courses with physical components or organized social media connections. The existence of those types of social supports is not evident for any of the courses included in this study. These types of social supports have been well-received by students seeking them. There is not solid evidence that in-person or online social supports increase satisfaction, or motivation, or completion, but they are present in some contexts (Kizilcec & Cohen, 2017).

Further, a few studies have attempted to diminish the impact of professor involvement and availability on MOOC course completion outcomes (Tomkin & Charlevoix, 2014). These studies reported that the availability of full-time faculty interacting with students who had questions and/or social needs did not change completion rates (Kizilcec & Cohen, 2017). This study seems to emphasize the 'relatedness' types of interaction with course instructional staff. Additional interventions to determine if social needs can be met with small groups and/or teams may help to elucidate how social motivation works in various MOOC contexts. Kulkarni et al. (2015)

assigned learners to discussion groups with variable levels of geographic and/or gender

homogeneity. The results suggest that learners profited from being placed in groups

geographically diverse groups with learners from other countries. Students improved

performance in peer discussions and yielded short-term improvements in performance.

These results suggest that social learning resulted in more motivation for MOOC

students, at least in the short-term. An increase in performance as a result of increased

motivation would be consistent with Self Determination Theory.

Table 5.4

Implications for Theory, Research, and Practice for Research Question Three:

1) Learners who identify Social Motivations for enrolling do not report high levels of satisfaction with the use of technology to cooperate and connect with others in the course. Greater effort by course instructional teams to identify and socially connect to socially motivated learners will result in more engagement, satisfaction, and completion.

2) Students who enroll in a MOOC to forge a connection with the Instructor report immediate frustration with that goal.

3) Students who identified 'career change, meeting new people, or improving English also simultaneously reported frustration with the course meeting their needs to belong. Students pursuing a career change need special social supports.

4) Students who were trying to 'meet new people' or 'practice English' reported that they felt stifled in their pursuit of social goals and disconnected from the other learners in the class.

The current findings also help to frame additional possible future research questions. How is the OLEI item #6 'career change' related to social motivation? Do individuals who express a desire to change careers persist in MOOCs? Would these learners be better supported by establishing small groups of learners who are interested in changing their careers? Do different types of social supports result in changing levels and types of motivation? Does the intensity of that motivation change situationally after social supports are provided to learners? Can generating a sense of belonging and connectedness be accomplished by student-to-student or peer-to-peer interactions? If so, how? How can we measure 'relatedness' motivation situationally and unobtrusively in the MOOC context. Could the SIMS help measure that?

Current practitioner knowledge of social support is in its infancy. Beyond meet-ups and video chats, few peer reviewed studies explore how to provide more-robust support for socially-motivated MOOC learners. The current findings for RQ3 advance practitioner knowledge and understanding of social motivation in MOOCs. Some individuals who declare social motivations are already experiencing levels of frustration. Individuals who enroll in MOOCs with social motivations do not feel robustly supported or made to feel as though they belong in many typical types of MOOCs. Practitioners can use the OLEI answers to produce small groups that should help MOOC learners find more ways to meet their social motivation needs. This simple and practical intervention could be accomplished with one 13 item scale, a discussion board, a dedicated facilitator (this learning community could even be lead by a former student who has successfully completed the course).

Research Question Four: OLEI criterion validity with Amotivation

The ten hypotheses tested in Research Question Four encompassed amotivation. Amotivation, as a construct, is described by Deci and Ryan (2017) as the absence of drivers sufficient to move a being to action. An 'amotivational' learner is a person who is not moved by the needs for autonomy, competence, or relatedness. An 'amotivational' learner may have been motivated in the past, but has since experienced frustration attempting to satisfy their motivational needs; hence, that learner's motivation has decreased. At a certain point, the inability to satisfy a need with a behavior results in the unsatisfying behavior being engaged in less and less, and potentially discontinued altogether, as the learner experiences fewer internal, external, or social rewards versus the effort spent to achieve those rewards relative to other pursuits.

Functionally, Research Question Four acts as a measure of discriminant validity in the current study. Because amotivation is the absence of the other three types of motivation examined in the current study, amotivation scores as measured by Vallerand's et. al's AMS might help to further elucidate the high 'drop-out' rates in MOOCs. In Research Question Four the previously computed OLEI item average scores were associated with the AMS subscale for Amotivation.

Theoretically, Research Question Four may provide insight into which types of student enrollment motivations are associated with a lack of motivation to persist. In other words, which students primary needs place them most at risk for not completing or for not fully satisfying their own enrollment intentions? Practically, if Self-determination theory is a useful heuristic for evaluating amotivation in MOOCs, then interventions

designed to bolster motivation might successfully increase learner pursuit of goal directed behavior and higher levels of learning satisfaction from their participation in MOOCs.

Research Question Four demonstrated statistically significant associations for seven of the ten hypotheses; however, all ten hypotheses resulted in associations consistent with the AMS and with Self-Determination Theory. Overall, Research Question Four is partially supported and partially not supported, despite the results being consistent with SDT as explained in the next sections. Finally, Research Question Four is a bit different from the previous three. Each of the previous research questions compared OLEI items with different scales representing different parts of Self-determination theory. Research Question Four compares the already established 10 permutations of OLEI item groups as the independent variable; however, rather than using ten different scales from SDT, Research Question Four uses only the AMS subscale for Amotivation as the dependent variable. For brevity those four items are listed here rather than situated in each of the subsections of Research Question Four. Semantically, all these Amotivation items appear to question why the student enrolled in or pursued the educational opportunity in the first place. The questions recognize that motivation was once present, but is now waning, lacking, or absent for whatever reason. The Amotivation subscale simply denotes the absence of motivation; the subscale does not implicate why a learner feels like their learning needs have been unsatisfied. AMS subscale for Amotivation items include items like 'I once had good reasons for going to college; however, now I wonder whether I should continue', 'I can't see why I go to college and frankly, I couldn't care less', 'I don't know; I can't understand what I am

doing in school'. The AMS *Amotivation* subscale scores function as the dependent variable in each of the ten associations that follow.

H4A. The results of this correlation demonstrated a weak, positive association between extrinsic motivation-oriented OLEI items 2, 3, 4 & 6 (e.g. "taking the course for 'job', 'degree', 'academic research', or 'career change') and the AMS subscale for amotivation. Results were $r(66) = .28^*$, $p < .05$. This association is strong enough to reject the null hypothesis that the relationship was zero. From a semantic perspective, these OLEI items all seem to focus on future rewards and the possibility to use education or the course to change future reward systems and affiliations. Interestingly, this association suggests that MOOC students who enroll in the course for their current job, to augment their academic studies/research or to change careers, they may be experiencing doubt and amotivation very early in the course.

H4B. The results of this correlation demonstrated a weak, positive association between extrinsic motivation-oriented OLEI items 2, 3, 4, 6, 10 & 11 (e.g. "taking the course for 'Job', 'degree', 'academic research', 'career change', 'earn certificate', or 'course offered by prestigious university/professor) and the AMS subscale for Amotivation. Results were $r(66) = .31^*$, $p < .05$. This association is strong enough to reject the null hypothesis that the relationship was zero. From a semantic perspective, these OLEI items retained the focus on the use of the course, but also added more items that deal with earning a certificate (contingent self-esteem) and affiliating with a 'prestigious university/professor'. Both of these items involve viewing worth from the perspective of being 'worthy' in the estimation of the course or a professor (e.g. someone external to the learner). This result seems to suggest if a student is seeking a credential or

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an opportunity to affiliate with an academically attractive university or professor, then that learner is already experiencing measurable levels of amotivation.

H4C. The results of this correlation demonstrated a weak, positive association between extrinsic motivation-oriented OLEI items 2, 3, 4, 6, & 10 (e.g. "taking the course for 'job', 'degree', 'academic research', 'career change', or 'earn certificate'") and the AMS subscale for Amotivation. Results were $r(66) = .29^*$, $p < .05$. This association is strong enough to reject the null hypothesis that the relationship was zero. From a semantic perspective, these OLEI items retained the focus on the use of the course for future benefit, but also eliminated the affiliation enrollment motivation and kept the certificate motivation. This result also suggests that if a student is seeking a credential, with or without the opportunity to affiliate with an academically attractive institution or potential collaborator, then the student is already experiencing measurable levels of amotivation.

H4D. The results of this correlation demonstrated a very weak, positive association between intrinsic motivation-oriented OLEI items 1, 5, & 7 (e.g. 'taking the course for 'general interest', 'personal growth', or 'fun and challenge') and the AMS subscale Amotivation. Results were $r(66) = .13$, $p < .05$. This association is not strong enough to reject the null hypothesis that the relationship was zero. This association failed to reject the null. In this case, items positively associated with intrinsic motivation 'to know' did not correlate in a statistically strong enough fashion to assert that intrinsic motivation is related to amotivation. From a semantic perspective, these OLEI items all seem to focus on satisfaction from learning new things, general interest in the topic, and broadening knowledge. When learners report these enrollment motivations on the OLEI,

their scores on measures of amotivation are lower than those who report extrinsic or social motivations. These findings are consistent with the theoretical model of self-determination described in Chapter Two.

H4E. The results of this association demonstrated a very weak, positive association between OLEI items #5 & #10 ("taking the course for", 'personal growth' or to 'earn a certificate of accomplishment') with items from the AMS subscale for Amotivation. Results were r (66) =.17, $p < .05$. This association is not strong enough to reject the null hypothesis that the relationship was zero. This association failed to reject the null. In this case, that means that items positively associated with intrinsic motivation to know did not correlate in a statistically strong enough fashion to assert that intrinsic motivation and amotivation are related in this study. From a semantic perspective, these OLEI items seem to focus on enrolling in a MOOC to develop oneself and grow or earning a certificate of accomplishment. When learners report that they are enrolled in a MOOC for personal growth or to earn a certificate they do not concurrently report significant levels of amotivation. Because Self-Determination Theory posits that intrinsic motivation is the most powerful type of motivation, this association is consistent with SDT as decomposed in Chapter Two.

H4F. The results of this hypothesis demonstrated a very weak, negative association between intrinsic motivation and amotivation. This association correlated OLEI items #7 & # 9 (e.g. "taking the course for", 'fun & challenge' or to 'experience and online course') with items from the AMS Amotivation subscale. Results were r (66) = -.05, $p < .05$. The strength of this association was considered not robust enough to reject the null hypothesis. This association failed to reject the null. In this case, that

means that items from the OLEI positively associated with intrinsic motivation did not correlate in a statistically strong enough fashion with the AMS Amotivation subscale to assert that OLEI intrinsic motivation items and amotivation are related in this study. From a semantic perspective, these OLEI items all focus on a sense that education is grounded in a pursuit for experiencing stimulation. Again, the OLEI items both seemed to explore enrollment intentions that speak to a certain level of stimulation seeking that a student might experience when pursuing 'fun' and/or 'challenge' in learning or experiencing an online course for the first time. These results suggest that fun and experience seeking are negatively associated with amotivation. Because Self-determination theory posits that intrinsic motivation is the most powerful type of motivation, this inverted association is consistent with SDT as decomposed in Chapter Two. Intrinsic motivation is more powerful than extrinsic motivation. Weak extrinsic motivation becomes more similar to intrinsic motivation the more that motivation interacts with social motivations. Relatedness moderates and influences the need for demonstration of competence (Deci & Ryan, 2017). After that moderation happens, competence needs appear more like autonomy needs (Carbanneau et al., 2011).

H4G. The results of this association demonstrated a moderate, positive association between social motivation OLEI items and the AMS subscale for Amotivation. Results were r (66) = .40**, p < .05. The strength of this association was considered robust enough to reject the null hypothesis. This association correlated OLEI items #8, # 12, & #13 (e.g. "taking the course for", 'meet new people', 'take course with colleagues/friends, or to 'improve my English skills') with average respondents' scores on the AMS subscale for Amotivation. From a semantic perspective, these OLEI items all

focus on a enrolling in the course for socially motivated reasons. The results indicated a moderate, positive association between social motivations as reported on the OLEI and Amotivation. This moderately strong, positive association raises the possibility that if MOOC students report that they enrolled in the course due to social motivations that they are simultaneously frustrated in their pursuit of social connection and relatedness. This result of this analysis is consistent with Self-determination theory, as operationalized by the AMS, which posits that learners are motivated by intrinsic, extrinsic, and social motivations. That amotivation results when the satisfaction of needs is frustrated. The result suggest that MOOC students who report social motivations are concurrently amotivated, and potentially at greater risk for not continuing in the MOOC or reporting that the satisfaction of their learning goal was suppressed.

H4H. The results of this association demonstrated a weak, positive association between social motivation OLEI items and the AMS subscale for Amotivation. Results were r (66) = .38**, p < .05. The strength of this association was considered robust enough to reject the null hypothesis. This association correlated OLEI items # 12, & #13 (e.g. "taking the course for", 'to take course with colleagues/friends, or to 'improve my English skills') with average respondents' scores on the AMS subscale for *Amotivation*. From a semantic perspective, these OLEI items all focus on a enrolling in the course for socially motivated reasons. The results indicated a weak, positive association between social motivations as reported on the OLEI and Amotivation. This weak, positive association raises the possibility that if MOOC students report that they enrolled in the course due to social motivations that they are simultaneously frustrated in their pursuit of social connection and relatedness. This interpretation of this result is consistent with Self-

Determination Theory, as operationalized by the AMS, which posits that learners are motivated by intrinsic, extrinsic, and social motivations. Amotivation results when the satisfaction of our needs is frustrated. The result suggests that MOOC students who report social motivations are concurrently amotivated, and potentially at greater risk for not continuing in the MOOC or reporting that the satisfaction of their learning goal was stifled.

H4I. The results of this association demonstrated a weak, positive association between social motivation OLEI items and the AMS subscale for Amotivation. Results were $r(66) = .35^{**}$, $p < .05$. The strength of this association was considered robust enough to reject the null hypothesis. This association correlated OLEI items #8 & # 12 (e.g. "taking the course for", 'meet new people' or 'take course with colleagues/friends') with average respondents' scores on the AMS subscale for *Amotivation*. From a semantic perspective, these OLEI items all focus on a enrolling in the course for socially motivated reasons. The results indicated a weak, positive association between social motivations as reported on the OLEI and *Amotivation*. This weak, positive association raises the possibility that if MOOC students report that they enrolled in the course due to social motivations that they are simultaneously discouraged in their pursuit of social connection and relatedness. This result of this analysis is consistent with Self-Determination Theory, as operationalized by the AMS, which posits that learners are motivated by intrinsic, extrinsic, and social motivations. amotivation results when the satisfaction of needs is frustrated. The result suggests that MOOC students who report social motivations are concurrently amotivated, and potentially at greater risk for not continuing in the MOOC or reporting that the satisfaction of their learning goal was inhibited.

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H4J. The results of this association demonstrated a moderate, positive association between social motivation OLEI items and the AMS subscale for Amotivation. Results were r (66) = .40**, p < .05. The strength of this association was considered robust enough to reject the null hypothesis. This association correlated OLEI items #8, & #13 (e.g. "taking the course for", 'meet new people' or to 'improve my English skills') with average respondents' scores on the AMS subscale for Amotivation. From a semantic perspective, these OLEI items all focus on a enrolling in the course for socially motivated reasons. The results indicated a moderate, positive association between social motivations as reported on the OLEI and Amotivation. This moderate, positive association raises the possibility that if MOOC students report that they enrolled in the course due to social motivations that they are simultaneously frustrated in their pursuit of social connection and relatedness. This interpretation of this result consistent with SDT, as operationalized by the AMS, which posits that learners are motivated by intrinsic, extrinsic, and social motivations. Amotivation results when the satisfaction of needs are frustrated. The result suggests that MOOC students who report social motivations are concurrently amotivated, and potentially at greater risk for not continuing in the MOOC or reporting that they were unable to satisfy their learning goal(s).

Potential implications for theory, research, and practice for Research Question Four

There are many potential implications for MOOC motivation theory, research, and practice from the associations explored in Research Question Four. On balance, Research Question Four is well-supported by the results. Significant levels of Amotivation were associated with extrinsic and social motivations items from the OLEI. These two types of motivation are considered less intense and powerful by Self-

Determination Theory. Subsequently, Research Question Four is generally supported by the results. Seven of the ten hypothesized associations analyzed in Research Question Four were significant enough to reject the null hypothesis. The failure to reject the null with regard to RQ4D, RQ4E, & RQ4F only serves to confirm further Self-Determination Theory as conceptually and theoretically related to the many OLEI items.

Table 5.5

Implications for Theory, Research, and Practice for Research Question Four:

1) Strong or weak associations between extrinsic motivational items and amotivation are consistent with Self-Determination Theory. Motivation exists along a continuum from Intrinsic motivation (the highest level of motivation) to Amotivation (the lowest level of motivation). Weak and Moderate associations with Amotivation bolster the notion that the SDT is an appropriate theoretical framework to examine MOOC motivation.

2) Very weak or negative associations with intrinsic motivation and amotivation are also consistent with the Discriminant Validity function of the amotivation scale in the survey. Theoretically, amotivation is the opposite of intrinsic motivation. The associations in the current study support this theoretical relationship.

3) Moderate and weak associations between social motivation and amotivation are consistent with SDT and with instructional choices in MOOCs. Self-determination theory postulates that social motivation helps moderate extrinsic motivation into intrinsic motivation. If the achieving social goals is stifled in MOOCs, then more robust correlations between Amotivation and social motivation simply reflects the socially impoverished nature of the MOOCs included in the sample. Many MOOCs do not offer opportunities to connect or relate to the instructional staff or to other learners. If students initially enrolled for social reasons, then they will also report strong associations with amotivation early in the course.

Ideally, when researchers include metrics that are designed to evince discriminant validity, as was the research design in this study (associating intrinsic motivation items

on the OLEI with Amotivation), the lack of association demonstrates that individuals in this sample did not concurrently report high levels of intrinsic motivation and high levels of amotivation. According to SDT, that is how motivation should behave in all contexts, MOOCs included.

These findings have important implications for MOOC motivation theory, research, and practice. First, students who declare social motivations are likely already experiencing amotivation. Potentially, interventions built on Self-Determination Theory might serve to help students reframe their motivation and foreground motivational intents that remain salient. Second, this finding merits additional research to further explore simultaneous connections between social motivations and higher self-reports of Amotivation. Third, students who identify social motivations should be grouped together into video chat groups. Students who identify social motivations should be encouraged to establish their own communities on Discord or other team sites. MOOC designers and teachers should invest significant thought about how amotivation appears to be a manifestation of frustrated learning goals (Deci & Ryan, 2017). More than a few MOOC researchers and theorist have dismissed the low course completion rates in MOOCs by indicating that course completion looks at the wrong metric (Clow, 2012; Kolowich, 2014). These scholars suggest instead to evaluate the satisfaction of intention. However, that convenient dismissal ignores long establish pretext in educational psychology that volitional control is the fuel that powers the human experience (Pintrich, 2003). Merely making social goals impossible to pursue immediately limits the learning possibilities for many students. MOOC providers and teachers should more robustly support the socialization and interaction needs of MOOC learners.

Implications for higher education administration and leadership

The MOOC has arrived. Class Central's 180 million MOOC users mostly assumes North & South American, European, and Australian MOOCs (Shah, 2020). Chinese, Korean, Japanese, Indian, and African MOOCs are not included in the figure. Australia is currently using MOOCs to deliver most distance education. In highly organized educational systems throughout the educated world, MOOCs increasingly complement or supplant online learning and brick and mortar classes. The implications of these trends are exciting and terrifying. Sebastian Thrun has walked back his bombastic claim that the MOOC would herald a period of decline and consolidation for the university that would transform higher education. Thrun infamously predicted that the MOOC would lead to the compression of the higher education sector to 50 or less universities globally by 2050. While Thrun's controversial claim was derided widely, one must meekly observe that the deadline for his prophecy coming true has yet to expire.

Arizona State University has levered MOOCs to create their Global Freshman Academy. ASU uses MOOCs to teach tens of thousands of Starbucks employees their first 24 to 60 college credits for a fraction of the sticker price at a local four-year. The price is actually competitive with most American community colleges. MOOCs have tremendous potential to have positive interactions with other transformational educational trends.

Many MOOCs function as a textbook. Several MOOC designers envision their courses as a digital textbook. The textbook is just one area where MOOCs are positively interacting with the trend towards Open Education Resources (OERS: free textbooks). OERS are rapidly expanding and have the potential to dramatically decrease education

costs to students and virtually eliminate academic publishing companies in all but a handful of disciplines. MOOCs and technology possess tremendous potential to change higher education financially, organizationally, pedagogically, and socially. The academy, coupled together with mostly private, for-profit corporations, now has a knowledge distribution engine powerful enough to have a global reach just as generations of students are deciding that sitting in a college classroom with hundreds of other students may not be the safest choice during a global pandemic.

In light of these global and domestic trends, MOOCs should be studied with increasing levels of precision and complexity. More effort to apply existing scales from educational psychology, educational science, and behavioral psychology is appropriate. This dissertation was an effort to apply established behavioral science and educational psychology to MOOCs.

There are four important implications for higher education administration and leadership in this study: 1) The OLEI demonstrates adequate concurrent validity with AMS extrinsic motivation items, and the OLEI demonstrates adequate concurrent validity with AMS intrinsic motivation – To Know items; 2) the findings suggest that a representative cross-section of courses on the Coursera and edX platforms are not collaborative and/or do not provoke feelings of relatedness or belonging; 3) MOOC students with high levels of social expectation may quickly show signs of amotivation; 4) Amotivation is a dramatically undervalued and underappreciated metric in the study of MOOCs generally and online education more broadly.

The first implication, that the study evinces strong, moderate, and weak associations between AMS intrinsic and extrinsic items is important to the transformation

of MOOCs from a poorly ran version of a 'choose your own educational adventure' to a professionalized, personalized, and more useful educational offering. The AMS evaluates three motivational states with seven motivational scales along a continuum. This study showed that the OLEI adequately demonstrates concurrent validity with all three motivational states (intrinsic, extrinsic, and amotivational). The data further demonstrated that the OLEI demonstrated adequate concurrent validity with four out of six of the intrinsic and extrinsic subscales. This finding is significant for higher educational administrators who are assisting with MOOC oversight or renegotiating terms of service with MOOC providers. The OLEI is a simple 13 item instrument. Deploying the OLEI gives course administrators significant insight into several motivational types and states. MOOC instructors and instructional designers can design at least three distinct personalized learning tracks based on these results: 1) Using the course as a learning resource, 2) Using the course to advance myself, 3) Using the course to socialize. Understanding 'why' students are there will dramatically increase student satisfaction with and use of MOOCs.

The second implication is students enrolled in the courses included in this sample reported low levels of collaboration and had fairly low expectations for interactions with the instructional staff. Additionally, these students did not report that they felt socially engaged with other learners in the course. Students who do have positive expectations about possible interactions in MOOCs are surely frustrated when the course does not live up to their expectations. Despite the convenience and scale of MOOC learning, it is remarkably easy to get lost in the shuffle and grow disillusioned with the course. Higher education administrators and leaders should invest more thought in how the MOOCs that

their faculty are associated with create and nurture community, represent the social interactions that they want to happen under their brands, and how their MOOCs make people feel about their brick and mortar institutions.

The third implication is that many students who report enrolling in the course with the intent of engaging in social interactions concurrently report that they are amotivated. They enrolled in the MOOC with high hopes of learning and connection with like-minded individuals. They quickly become disillusioned and frustrated and fail to return to the course. Higher education administrators must understand that most global citizens will never visit their library, or new dormitory, or science classroom. Most global citizens interact with global universities in a small handful of ways. A short and incomplete list of interactions includes: televised sporting event or academic competition that features a university's students or student-athletes, the academic power projection of publication, scholarship, invention, and public relations; or through an experience in a MOOC. Why do administrators invest so much money in the first two and so little in the last one? Arguably, the investment in the MOOC infrastructure is more in keeping with the university's mission to create and share knowledge than chasing a conference title in any sporting-related concern. Academic administrators and educational leaders should understand that the classes that they put out into MOOCs for free represent their brands to the public and represent a significant opportunity to dramatically increase the sphere of the university's influence and reach. More global academic cooperation and sharing is in keeping with most universities' missions.

The fourth implication is that the Academic Motivation Scale – Amotivation subscale is an undervalued metric for evaluating online education generally and MOOC

instruction specifically. Amotivation is a peculiar construct in some ways. People loose motivation for many reasons. Other priorities constantly leap into the foreground demanding attention. The modern world seems designed to captivate and monopolize our attention with every keystroke and swipe. Amotivation levels are likely variable over time. Longitudinal studies are needed to determine how amotivation varies across the duration of a MOOC. The AMS - Amotivation subscale is a short 4 item measure that allows researchers to quickly measure situational motivation. Educational psychologist and researchers should reword and validate the Amotivation subscale and other AMS subscales for use in online contexts. The Covid-19 global pandemic has forever changed the landscape of global higher education. Universities really are able to provide much instruction in both a synchronous and asynchronous formats. An entire slice of the introverted higher education landscape is looking forward to never setting foot within 10 feet of another student on-campus for as many courses as they can manage. All of the trends point to a larger footprint for online learning broadly and MOOCs specifically. Understanding amotivation as a situational variable that varies in online courses over time is an important next step to ensuring that the courses serve students who select them for convenience, out of necessity, because that is what their employer offered them, or to avoid social anxiety. Greater understanding of amotivation will help higher education administrators make informed decisions about course scheduling, course flow, instructional bottlenecks, and pitfalls in weeding courses. In short, greater understanding of amotivation in online learning should lead to better administration of the academy.

Delimitations

This study lends additional insight into why people sign-up for MOOCs. Despite some important findings, this inquiry has some limitations which impact the ability to generalize about these specific results to larger populations of MOOC students. Seven challenges decreased the generalizability of these results to outside contexts. First, MOOC research is difficult to conduct. Many studies about MOOC behavior may involve some taking of self-reports. Those self-reports are always more likely to be completed by learners in MOOCs if the instructor encourages the students to complete the survey. No instructor permission was sought in this study. Instead, the URL to the survey was posted to discussion boards early in the term. Undoubtedly, response rates and sample size are bolstered by instructor permission and encouragement. Great instructor participation would have increased sample size and therefore increased power and generalizability of the results.

Second, this sample is from only two different MOOC providers (Coursera and edX). While these two MOOC providers dwarf the enrollments of most other providers, they are both based in the United States and are affiliated with top-tier exclusive American universities Stanford, Harvard, and MIT. These two MOOC providers are more similar in their reliance on top-down course designs, lots of educational video, and andragogic methods that resemble a large, impersonal freshman lecture course. Other MOOC providers have different teaching models, produce learning from a constructivist perspective, have different sorts of certificate options, or involve more formal, credit bearing courses. For example, Open2Study in Australia and XuetangX in China are examples of different types of MOOC providers that offer more-formal credit.

FutureLearn in Europe is an example of a MOOC provider that uses more Socratic method and dialogue to produce learning. Broader representation of MOOC providers that foreground different teaching and learning strategies would result in better generalizability of these results.

Third, this sample was intended to provide a contrast between edX and Coursera; however, of the 68 responses to the surveys included in this study, 59 came from the Coursera platform. In fact, one professor teaching on the edX platform asked for the URL to be removed from their course and encouraged the removal of the URL from other edX courses. This difficulty not only decreased the ability of the study to compare edX and Coursera, but also underscores the difficulty in studying MOOCs. Kizilcec and Cohen (2017) established the necessity to bring multiple perspectives to bear in MOOC research. Pre-course self-reports must be analyzed in tandem with recorded activity tracking. One without the other is less useful. However, prior to initiating the collection of data Coursera failed to respond to a request to post this study URL in their courses. edX did respond to the request and indicated that no cooperation would be given. MOOC researchers face significant hurdles in securing site access to MOOC students. Greater cooperation from MOOC providers with researchers is welcomed.

Fourth, while the sample size gathered for analysis was 117, only 68 of the respondents provided complete responses to all items used in the study. The sample size was limited by site access and by length. The survey included demographic items, OLEI items, AMS items, and items from three social motivation scales. The number of items no doubt contributed to decreased sample size and to mortality in completion of the survey instruments. Of 49 students who did not complete the whole survey approximately 30 of

those respondents started to answer the questions and then stopped sometime during the social motivation items (last 20% of the survey).

Fifth, confirmation bias limits the generalizability of the results. This study relied exclusively on self-report questionnaires. Methodology research indicates that self-reports contain confirmation bias. In other words, individuals who are taking the study report more behaviors that researchers are looking for because they are already self-selecting to participate in the study. Individuals who participate in the study do so because they are already more motivated; hence, potentially skewing results in favor of effects that would otherwise remain under-reported.

Sixth, smaller online samples tend to confirm hypothesis with stronger associations than would be found with larger samples or non-computer-mediated surveys.

Seventh, wording may have also contributed to mortality or failure to complete by the 49 respondents who provided partial information. Rather than rewording the AMS and the social motivation subscales to equate with a MOOC or online context, the items were used without alteration and the respondents were asked to substitute the word MOOC for school or college. The semantic gymnastics associated with item wording may have contributed to decreased sample size and increased mortality within the responses.

Conclusion

Motivation is widely recognized to be dynamic, multi-faceted, processual, contextual, and deeply personal. Motivation is and will always be the fuel that drives the human experience. Without motivation, the desire to engage in Self-Regulated Learning does not exist. Many of the existing measures of Self-Regulated Learning (SRL) include

items that measure intrinsic and extrinsic motivation. The difficulty confronting MOOC and online education researchers who try to use these instruments is that some of the intrinsic and extrinsic items are included in scales like "Goal Orientation" or "Task Value" or "Locus of Control". This study seems to support the notion that the OLEI is able to effectively, albeit bluntly, inventory existing, forethought-based, intention-oriented, enrollment-motivations in MOOCs. In fact, the OLEI, despite only containing 13 "applies" or "does not apply" items, actually taps into the three primary constructs articulated as the crucial motivators of all human behavior: autonomy, competence, and belonging. These three needs are represented by the three primary categories of OLEI responses, intrinsic items, extrinsic items, and social items.

Future studies wishing to measure SRL in MOOCs or online contexts, should seriously consider using the OLEI instead of more traditional items from SRL inventories that assume a brick and mortar context, or that fail to adequately represent the richness of extrinsic and intrinsic motivation. The OLEI appears to adequately inventory the presence of intrinsic, extrinsic, and social motivations in a MOOC context. MOOC course designers, professors, and providers only need knowledge about a learner's basic pre-course enrollment intention motivation to design a learning track that more closely associates with the desired learning path as initially declared by the MOOC student. Many existing SRL-items that denote the presence of intrinsic, extrinsic, and/or social motivations may be adequately replaced with the OLEI. The OLEI should be given as a pre-course instrument for all MOOCs.

Further, the study of motivation and SRL in MOOCs may greatly profit from a comparison of existing SRL measures with the OLEI inventoried motivations.

Additionally, a deeper understanding of the "finer granularity" of motivation as a construct in Deci & Ryan's Self-Determination Theory appears to be a better theoretical framework for measuring and understanding initial enrollment motivation intentions in MOOCS. Further study of the OLEI with additional metrics may yield more associations and lend further credence to how the OLEI might function as a quick and unobtrusive inventory of motivation. The OLEI would profit from cross-cultural validation, from validation that assumes different types of courses, and from comparisons and associations with Self-Determination Theory and other relevant motivational constructs. A longitudinal study, which explores how motivation for MOOC learners remains static or varies as measured by the OLEI and by other measures of situational motivation (SIMS), also would be a welcomed contribution to future research efforts.

This study establishes support for applying SDT to online learning generally, to MOOCs behavior broadly, and to MOOC enrollment motivation specifically. At face value, Deci & Ryan's SDT appears better situated with constructs, a continuum, and a vocabulary that more closely approximates the motivations for MOOC enrollment as well or better than other theories. The value of SRL in MOOC motivation is obvious. SRL theory is best-situated to evaluate how students use motivation to accomplish their course goals within MOOCs. However, understanding enrollment intentions seems better served by the finer granularity of Deci & Ryan's robustly established theoretical framework, Self Determination Theory.

All three previous investigations attempting to qualitatively describe the complete possible universe of MOOC enrollment motivations all arrived at items encompassed by the OLEI (Kizilcec & Schneider, 2015; Williams et al., 2018; Milligan & Littlejohn,

2017). All OLEI items are encompassed within the continuum of the SDT. While SRL

models struggle with contextualizing how course motivations interact with strategies and

how those situational interactions impact levels of motivation, Deci & Ryan's theory

appears to adequately explain MOOC enrollment intention as evidenced by these

findings. The OLEI appears to accurately inventory basic human needs that are explained

by Self-Determination Theory. Reasonably, SDT equally or more cogently explains most

of the SRL behavior in MOOCS as well, but those conclusions lie outside the scope of

this study.

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APPENDICES

APPENDIX A: Search Process

As mentioned in Chapter Two Section titled "Search Process", a variety of search operators and processes were utilized to review the literature for this study. A detailed recounting of the searches executed on September 15, 2018 follows. In sum 79 articles were found in Proquest, 99 in EbscoHost, 31 in the Directory of Open Access Journals, and 733 in Science Direct. These figures included scores of replicated results. 942 journal articles, book chapters, and

Proquest:

"enrollment" in Title & "MOOC" in full text. Year operator All results after Janurary 1, 2008. Proquest 29 results.

"motivation" in Title & "MOOC in full text. Year operator All results after Janurary 1, 2008. Proquest 32 results.

"intention" in Title & "MOOC" in full text, Year operator All results after Janurary 1, 2008. Proquest 5

"OLIE" in Full Text & "MOOC" in Full text, Year operator All results after Janurary 1, 2008. Proquest 10

29 + 32 + 5 + 10 = 79 articles

EbscoHost:

Select All Databases

"enrollment" in Title & "MOOC" in full text. Year operator All results after Janurary 1,

2008. English Only, EbscoHost: 8 results.

"motivation" in Title & "MOOC in full text. Year operator All results after Janurary 1,

2008. EbscoHost: 79 results.

"intention" in Title & "MOOC" in full text, Year operator All results after Janurary 1,

2008. EbscoHost: 37 results.

"OLIE" in Full Text & "MOOC" in Full text, Year operator All results after Janurary 1,

2008. EbscoHost: 5 results.

8 + 79 + 37 + 5 = 99 articles

Directory of Open Access Journals:

"enrollment" in full text & "MOOC" in full text. All Dates selected. English Only,

Directory of Open Access Journals: 5 results.

"motivation" in full text & "MOOC in full text. All Dates selected. Directory of Open

Access Journals: 17 results.

"intention" in full text & "MOOC" in full text, All Dates selected. Directory of Open

Access Journals: 9 results.

"OLIE" in full text & "MOOC" in Full text, All Dates selected. Directory of Open

Access Journals: 0 results.

5 + 17 + 9 + 0 = 31 articles

ScienceDirect:

"enrollment" in full text & "MOOC" in full text. 2012. English Only, Directory of Open Access Journals: 181 results.

"motivation" in full text & "MOOC in full text. 2012. Research Articles, Book Chapters, Conference Abstracts. Directory of Open Access Journals: 397 results.

"intention" in full text & "MOOC" in full text, All Dates selected. Directory of Open Access Journals: 153 results.

"OLIE" in full text & "MOOC" in Full text, All Dates selected. Directory of Open Access Journals: 2 results.

$181 + 397 + 153 + 2 = 733$

APPENDIX B: Surveys, Scales, and Subscales

Total Items: (Demographics = 10), (OLEI = 14) (AMS-C28 = 28) (MSDLCL =4) (BSNS = 9)

Grand Total = 65 items

Demographic Information

1. What is your age?
2. What is your sex?
3. What is your nationality?
4. What is your postal code?
5. Which MOOC provider are you using? (Coursera or edX)
6. Which type of course are you taking now: (closed choice: 1 of 10)
7. In how many other MOOCs have you enrolled?
8. How many MOOCs have you completed?
9. What is your highest level of educational achievement?
10. What is your email address? (This will not be shared with anyone and will only be used to notify you if you win one of the four prizes/treasures)

Kizilcec & Schneider's (2015) Online Learning Enrollment Intentions Scale

Why did you enroll in this course?	Applies	Does not apply
General interest in topic	○	○
Relevant to job	○	○
Relevant to school or degree program	○	○
Relevant to academic research	○	○
For personal growth and enrichment	○	○
For career change	○	○
For fun and challenge	○	○
To meet new people	○	○
To experience an online course	○	○
To earn a certificate/statement of accomplishment	○	○
Course offered by prestigious university/professor	○	○
To take with colleagues/friends	○	○
To improve my English skills	○	○

Academic Motivation Scale

Version Attached: Full Test

PsycTESTS Citation: Vallerand, R. J., Pelletier, L. G., Blais, M. R., Brière, N. M., Senécal, C. B., & Vallières, É. F. (1992). Academic Motivation Scale [Database record]. Retrieved from PsycTESTS. doi: http://dx.doi.org/10.1037/t25718-000

Instrument Type: Inventory/Questionnaire

Test Format: The 28 items are each rated on a 7-point scale ranging from 1 = "Does not correspond at all" to 7 = "Corresponds exactly.".

Source: Supplied by author.

Original Publication: Vallerand, Robert J., Pelletier, Luc G., Blais, Marc R., Brière, Nathalie M., Senecal, Caroline, & Vallieres, Evelyne F. (1992). The Academic Motivation Scale: A measure of intrinsic, extrinsic, and amotivation in education. Educational and Psychological Measurement, Vol 52(4), 1003-1017. doi: 10.1177/0013164492052004025

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Scale Description

This scale assesses 7 types of constructs: intrinsic motivation towards knowledge, accomplishments, and stimulation, as well as external, introjected and identified regulations, and finally amotivation. It contains 28 items (4 items per subscale) assessed on a 7-point scale.

References

Vallerand, R.J., Blais, M.R., Brière, N.M., & Pelletier, L.G. (1989). Construction et validation de l'Échelle de Motivation en Éducation (EME). Revue canadienne des sciences du comportement, 21, 323-349.

ACADEMIC MOTIVATION SCALE (AMS-C 28)
COLLEGE VERSION

Robert J. Vallerand, Luc G. Pelletier, Marc R. Blais, Nathalie M. Brière,
Caroline B. Senécal, Évelyne F. Vallières, 1992-1993
Educational and Psychological Measurement, vols. 52 and 53

WHY DO YOU GO TO COLLEGE ?
Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you go to college.

Does Not Correspond at all	Corresponds a little		Corresponds moderately	Corresponds a lot		Corresponds Exactly
1	2	3	4	5	6	7

WHY DO YOU GO TO COLLEGE ?

1.	Because with only a high-school degree I would not find a high-paying job later on.	1	2	3	4	5	6	7
2.	Because I experience pleasure and satisfaction while learning new things.	1	2	3	4	5	6	7

3.	Because I think that a college education will help me better prepare for the career I have chosen.	1	2	3	4	5	6	7
4.	For the intense feelings I experience when I am communicating my own ideas to others.	1	2	3	4	5	6	7
5.	Honestly, I don't know; I really feel that I am wasting my time in school.	1	2	3	4	5	6	7
6.	For the pleasure I experience while surpassing myself in my studies.	1	2	3	4	5	6	7
7.	To prove to myself that I am capable of completing my college degree.	1	2	3	4	5	6	7
8.	In order to obtain a more prestigious job later on.	1	2	3	4	5	6	7
9.	For the pleasure I experience when I discover new things never seen before.	1	2	3	4	5	6	7
10.	Because eventually it will enable me to enter the job market in a field that I like.	1	2	3	4	5	6	7
11.	For the pleasure that I experience when I read interesting authors.	1	2	3	4	5	6	7
12.	I once had good reasons for going to college; however, now I wonder whether I should continue.	1	2	3	4	5	6	7
13.	For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.	1	2	3	4	5	6	7
14.	Because of the fact that when I succeed in college I feel important.	1	2	3	4	5	6	7
15.	Because I want to have "the good life" later on.	1	2	3	4	5	6	7
16.	For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	1	2	3	4	5	6	7
17.	Because this will help me make a better choice regarding my career orientation.	1	2	3	4	5	6	7
18.	For the pleasure that I experience when I feel completely absorbed by what certain authors have written.	1	2	3	4	5	6	7
19.	I can't see why I go to college and frankly, I couldn't care less.	1	2	3	4	5	6	7
20.	For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.	1	2	3	4	5	6	7
21.	To show myself that I am an intelligent person.	1	2	3	4	5	6	7
22.	In order to have a better salary later on.	1	2	3	4	5	6	7
23.	Because my studies allow me to continue to learn about many things that interest me.	1	2	3	4	5	6	7

24.	Because I believe that a few additional years of education will improve my competence as a worker.	1	2	3	4	5	6	7
25.	For the "high" feeling that I experience while reading about various interesting subjects.	1	2	3	4	5	6	7
26.	I don't know; I can't understand what I am doing in school.	1	2	3	4	5	6	7
27.	Because college allows me to experience a personal satisfaction in my quest for excellence in my studies.	1	2	3	4	5	6	7
28.	Because I want to show myself that I can succeed in my studies.	1	2	3	4	5	6	7

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KEY FOR THE AMS-28

# 2, 9, 16, 23	Intrinsic motivation - to know
# 6, 13, 20, 27	Intrinsic motivation - toward accomplishment
# 4, 11, 18, 25	Intrinsic motivation - to experience stimulation
# 3, 10, 17, 24	Extrinsic motivation - identified
# 7, 14, 21, 28	Extrinsic motivation - introjected
# 1, 8, 15, 22	Extrinsic motivation - external regulation
# 5, 12, 19, 26	Amotivation

Note: To use this scale you require only to mention the complete reference data.

substitute the word "MOOC" for "school" or "college". (Items 3, 5, 7, 12, 14, 19).

Motivation in Relation to Self-Directed Learning and Collaborative Learning-

Collaborative Learning with Internet Communication Technology Subscale: (7 point

Likert)

Collaborative Learning with ICT (CLT)
CLT1. In this class,my classmates and I actively share ideas in the online platforms.
CLT2. In this class, my classmates and I actively work together to construct ICT-based documents (e.g. presentation slides, web pages etc).

CLT3. In this class, my classmates and I contribute ideas to each other's work posted on the online platforms.

CLT4. In this class, my classmates and I actively discuss our ideas online to come up with better ideas.

1 = Strongly Disagree to 7 = Strongly Agree

Basic Student Needs Scale - Relatedness (4 point Likert)

...... 1. The teacher made me feel confident enough so I could ask anything freely.
...... 2. The teacher has been friendly and cordial with me.
...... 3. I felt that the teacher was friendly and willing to help.
...... 4. The teacher has been very understanding (puts his/herself in other people's place) about students'problems.

4. I quite agree	3. I agree more than I disagree	2. I disagree more than I agree	1. I quite disagree

Basic Student Needs Scale - Belonging (4 point Likert)

...... 1. There is a strong feeling of friendship in this group/class.
...... 2. I have felt at ease in this group/class.
...... 3. Being in this group/class feels like belonging to a large family.
...... 4. I get the feeling that we form a large team in this subject.
...... 5. I will remember my classmates from this group/class affectionately in the future.

4. I quite agree	3. I agree more than I disagree	2. I disagree more than I agree	1. I quite disagree

Appendix C: Data Analysis Procedures in SPSS-22

The data analysis procedures in the study are articulated by Richard Lomax & Debbie

Hahs-Vaughn in their (2012) Textbook, *An Introduction to Statistical Concepts*: Third

Edition (Routledge Publishers). The specific procedures to be followed in SPSS to

conduct a correlational study are explained in depth with screen captures. Specifically

Lomax and Hahs-Vaughn (2012) describe how to:

1) Input collected data into SPSS

2) Construct variables out of item averages and subscores

3) Produce a box plot of correlations to confirm the linearity assumption

4) Demonstrates how to compute Pearson's r for all desired correlations using SPSS

Report results in proper APA format

Again, all steps are described with detailed step-by-step procedures with screen grabs.
These graphics are not reproduced here for copyright purposes. These prescriptions are
part of Chapter Ten: Bivariate Measures of Association, pages 276-286 (Lomax & Hahs-
Vaughn, 2012).

Appendix D: Demographic Data
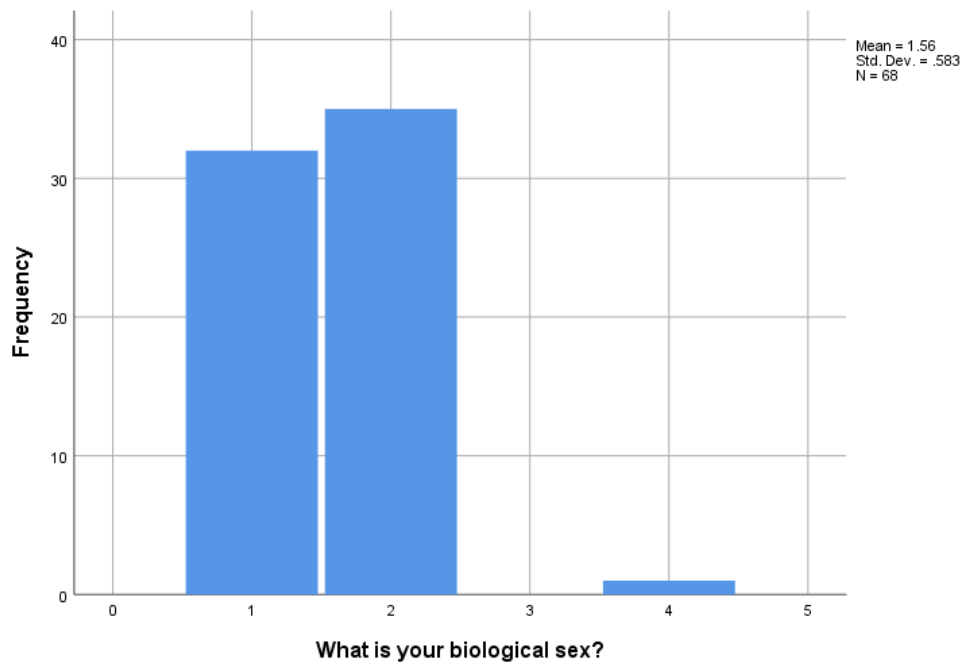
Figure D.1

Histogram of Respondents' Ages
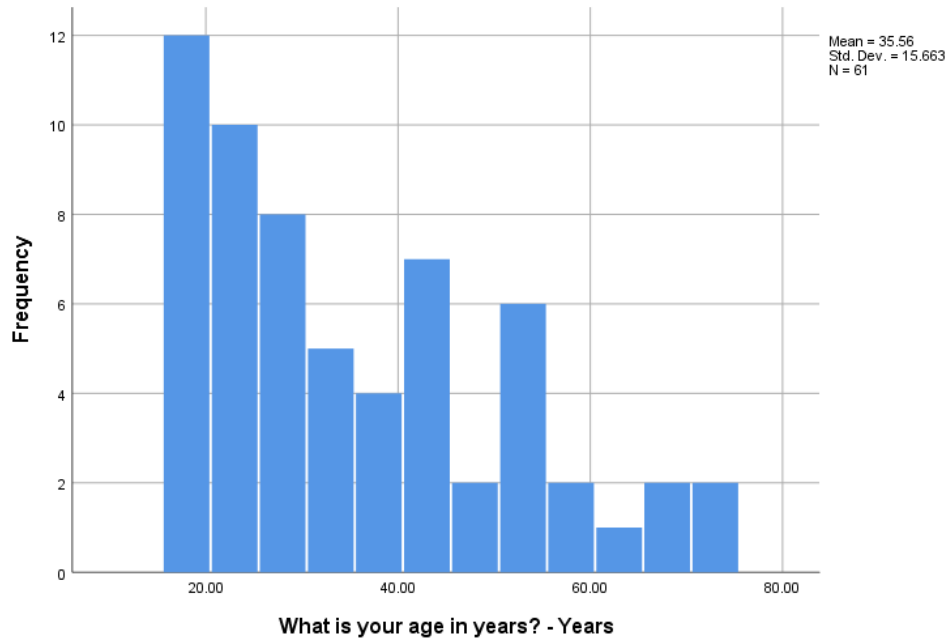
61 Respondents provided an age. 7 elected to not provide an age. Age was not a required response.

Figure D.2

Histogram of Respondent's Sex

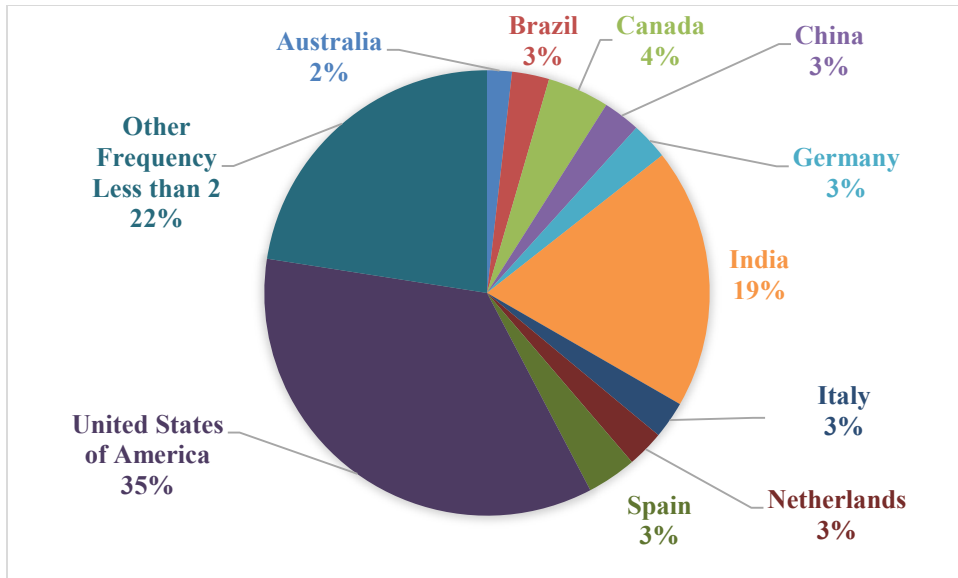1 = Female (35)

2 = Male (32)

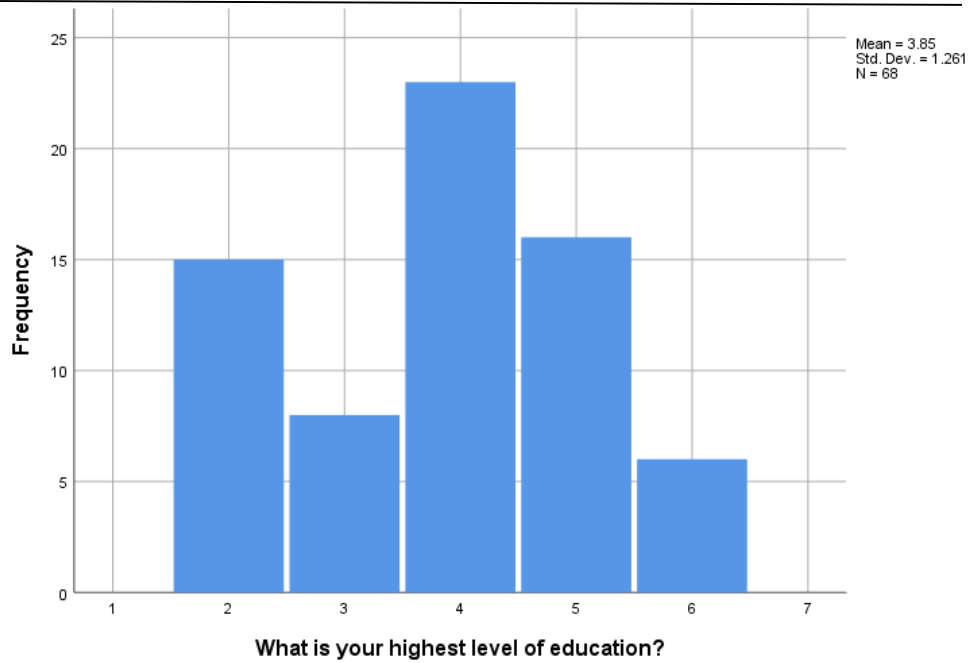3 = Both (0)

4 = Prefer not to respond (0)

Figure D.3

Pie Chart of Respondents Countries

Figure D.4

Education levels of respondents

2 = Completed high school / secondary school

3 = Attended college, did not graduate

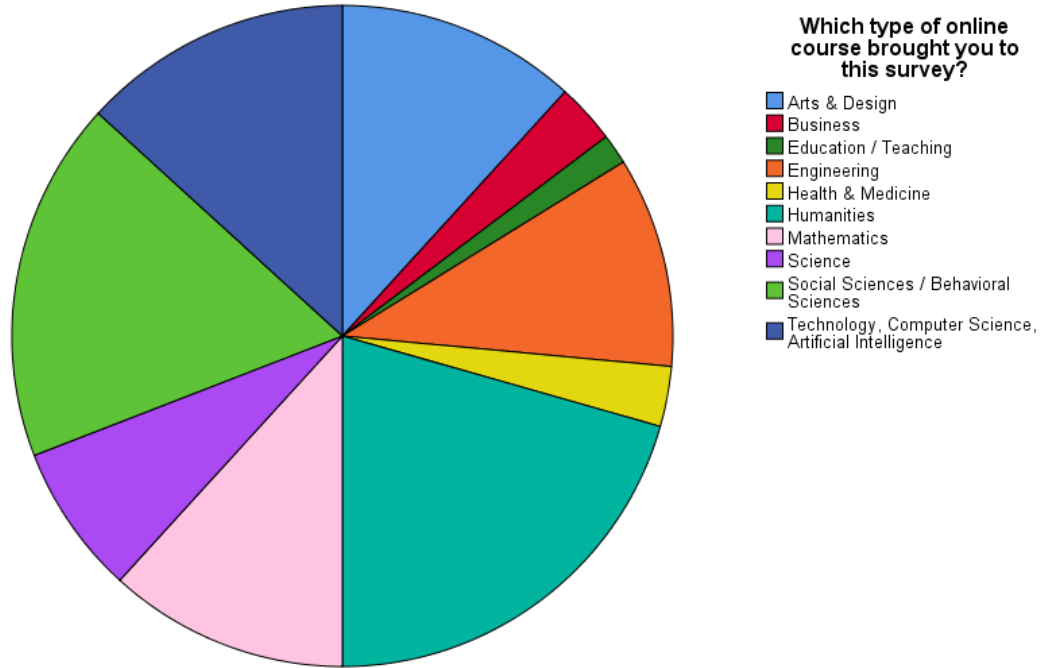4 = College Graduate

5 = Master's Degree

6 = Doctorate

7 = Attended technical school did not graduate

8 = Technical School Graduate

Figure D.5

Types of courses represented in the sample

Which type of online course brought you to this survey?

- Arts & Design
- Business
- Education / Teaching
- Engineering
- Health & Medicine
- Humanities
- Mathematics
- Science
- Social Sciences / Behavioral Sciences
- Technology, Computer Science, Artificial Intelligence

Table D.1.

Frequencies of Course Types

Course Type:	Number of Respondents:	Percentage of Sample:
Arts & Design	8	11.8
Business	2	2.9
Education / Teaching	1	1.5
Engineering	7	10.3
Health & Medicine	2	2.9
Humanities	14	20.6
Mathematics	8	11.8
Science	5	7.4
Social Sciences / Behavioral Sciences	12	17.6
Technology, Computer Science, Artificial Intelligence	9	13.2
Total	68	100.0

APPENDIX E: IRB APPROVAL DOCUMENTS

Oklahoma State University Institutional Review Board

Date:	03/27/2019
Application Number:	ED-19-26
Proposal Title:	OLEI Validity Study
Principal Investigator:	Jason Stone
Co-Investigator(s):	
Faculty Adviser:	Steve Wanger
Project Coordinator:	
Research Assistant(s):	
Processed as:	Exempt
Exempt Category:	

Status Recommended by Reviewer(s): Approved

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in 45CFR46.

This study meets criteria in the Revised Common Rule, as well as, one or more of the circumstances for which <u>continuing review is not required.</u> As Principal Investigator of this research, you will be required to submit a status report to the IRB triennially.

The final versions of any recruitment, consent and assent documents bearing the IRB approval stamp are available for download from IRBManager. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be approved by the IRB. Protocol modifications requiring approval may include changes to the title, PI, adviser, other research personnel, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any unanticipated and/or adverse events to the IRB Office promptly.
4. Notify the IRB office when your research project is complete or when you are no longer affiliated with Oklahoma State University.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact the IRB Office at 405-7443377 or irb@okstate.edu.

Sincerely,
Oklahoma State University IRB

VITA

JASON E. STONE

Candidate for the Degree of

Doctor of Philosophy

DISSERTATION: SELF-DETERMINATION THEORY AND MOOC ENROLLMENT MOTIVATION: VALIDATION OF THE ONLINE LEARNING ENROLLMENT INTENTIONS SCALE

Major Field: HIGHER EDUCATION

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Educational Leadership and Policy Studies at Oklahoma State University, Stillwater, Oklahoma in May, 2021.

Completed the requirements for the Master of Arts in Communication Liberal Arts Studies at Ball State University Muncie, Indiana in 1998.

Completed the requirements for the Bachelor of Arts in Speech at Southeastern Louisiana University, Hammond, Louisiana in 1997.

Experience:

Division Head / Assistant Professor of Communication, Oklahoma State University – Oklahoma City, 2008-Present.

Director of Debate / Instructor of Communication, University of Central Oklahoma, 2001-2006.

Director of Debate / Instructor of Rhetoric and Communication, University of Richmond, 1999-2001.

Professional Memberships:

Cross-Examination Debate Association, Oklahoma Association of Developmental Education, American Society of Talent Development, Central Oklahoma Chapter.