Learner profiles of attitudinal learning in a MOOC: An explanatory sequential mixed methods study

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ABSTRACT

The aims of the study were to investigate learner profiles in a MOOC focused on attitudinal learning, Science of Happiness, based on learner self-assessment of "happiness" and relationships with demographics, attitudinal learning gains and preferred instructional activities. A sequential explanatory mixed methods design was used in the attitudinal learning survey. The survey assessed cognitive, affective, and behavioral learning, and was followed by interviews with 12 participants. Latent profile analysis identified two profiles based on the differences in the levels and trends of happiness reported by learners during the 10-week course. Results indicated that MOOC learners described different preferences for exploratory or instructor-directed instructional strategies. Identified implications for the instructional design of MOOCs for attitudinal learning included recognizing that MOOC learners often view MOOCs more as entertainment as opposed to formal education. Therefore, course length, pace, scope, and difficulty should be considered in this light. Furthermore, supporting varied learner goals and interests, and instructional preferences are important. Finally, special consideration must also be paid to the design and facilitation of course discussions.

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1. Introduction

Massive Open Online Courses (MOOCs) have gained attention for taking the concept of increased access and expanding it exponentially, with thousands of students enrolling in courses that often are free or require a small fee for a formal certificate of completion. MOOCs bring together a diverse and global student population to learn about a topic from university instructors for little or no cost (Dillahunt, Wang, & Teasley, 2014). While MOOCs have been presented as a potentially transformative learning technology (Flynn, 2013), they pose challenges for instructional designers. Their massive enrollments, diverse students (Adair et al., 2014) and low cost present challenges that could negatively impact their efficacy as a tool for learning. Furthermore, MOOCs typically have high drop-out rates (Ye & Biswas, 2014) as their free cost means that students have limited investment in completing the course and often may enroll in courses for varied reasons (Littlejohn, Hood, Milligan, & Mustain, 2016), not all of which align with course completion.

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MOOCs have traditionally been offered on topics in the hard sciences (Rodriguez, 2012), but courses are being offered on social science topics such as human trafficking (Watson, Loizzo et al, 2016), animal behavior and welfare (Watson, Kim, & Watson, 2016) and food systems (Kim, Watson, & Watson, 2016) that explicitly target attitudinal learning outcomes. While attitudinal learning is a common instructional goal (Gagne, Briggs, & Wagner, 1992), it is often overlooked for more easily measurable outcomes such as cognitive learning given the hesitancy of researchers to claim cause-and-effect between instructional approaches and attitude change due to other potential "intervening forces" (Simonson & Maushak, 1996, p. 228). Furthermore, research on instructional design for attitudinal learning is limited (Enger & Lajimodiere, 2011), as is research evaluating the instructional design of MOOCs (Margaryan, Bianco, & Littlejohn, 2015) and research examining learner perspectives of MOOC effectiveness (Veletsianos, 2013). This study examines learner profiles and learner perceptions of the efficacy of instructional activities within a MOOC targeting attitudinal learning.

2. Literature review

2.1. MOOC learners and learner profiles

While MOOCs have been successful in offering higher education courses to massive numbers of learners, the large numbers and diversity create instructional design challenges such as how to engage so many learners (Adair et al., 2014) and how to meet their individual needs (Beaven, Codreanu, & Creuzé, 2014). Research describing the experiences and viewpoints of MOOC learners is limited (Veletsianos, 2013), and it is important to better understand how to design instruction to meet learners' diverse needs and goals.

Loizzo and Ertmer (2016) observed and interviewed twelve learners in a MOOC on human trafficking and found that the learning culture of MOOCs, while similar in some ways to traditional online learning environments, was complex due to its global nature. Furthermore, participants described how a lack of engagement with course discussion, described as lurking, was prevalent in MOOCs with many learners who only read and did not contribute to course discussions. Still, the learners reported learning despite this lack of contribution (Loizzo & Ertmer, 2016). Our recent case study (Watson, Loizzo, et al., 2016) on an animal behavior and welfare MOOC found that MOOC learners reported different attitudinal learning outcomes based on their purposes for enrolling.

A number of researchers have looked at learner cluster analysis as a means to better understand MOOC learners, their course behaviors, and individual needs. Analysis of learners has resulted in categorizing them by their course behavioral patterns and social interaction in order to predict performance (Balakrishnan & Coetzee, 2013), as well as their engagement patterns compared by gender, purpose for enrolling, accessing in-video assessments, and satisfaction (Kizilcec, Piech, & Schneider, 2013). Researchers have also examined learners' social networking behavior by analyzing discussion posts to examine the relationship between cognitive engagement and completion (Yang, Wen, Kumar, Xing, & Rosé, 2014). Cluster analysis not only supports the development of adaptive instructional interventions by taking into account variations in design, but also helps instructors and instructional designers predict and prepare for learner engagement and success (Park, Yu, & Jo, 2016).

2.2. Instructional design for MOOCs and attitudinal learning

MOOCs have been designed using a variety of pedagogical approaches and for different purposes and audiences (Adair et al., 2014). Typically, the instructional design of MOOCs has been categorized based on two historical models. AI-Stanford or xMOOCs are designed to be more instructor-driven with limited learner interaction (Rodriguez, 2012). cMOOCs are MOOCs based on a connectionist framework and designed to be driven by learners' social networking with limited instructor direction (Clarà & Barberà, 2013). The instructional design of MOOCs differs from that of traditional and online courses because of the massive number of participants who may not have been in brick and mortar institutions and may lack learning skills (Adair et al., 2014). Margaryan et al. (2015) conducted a study to investigate the instructional design quality of MOOCs, concluding that all of the 76 randomly selected MOOCs they reviewed failed to adhere to Merrill's (2002) first principles of instruction based on their evaluation instrument and largely exhibited a low level of instructional design quality.

In addition to the research on the instructional design of MOOCs, research has also been limited in addressing design for attitudinal learning (Enger & Lajimodiere, 2011). Attitude has been defined as the evaluation of a person, object, or event (Gagne et al., 1992; Thomas & Znaniecki, 1919; Zimbardo & Leippe, 1991). Attitudes are comprised of three components: affective, cognitive, and behavioral (Kamradt & Kamradt, 1999; Simonson, 1979; Zimbardo & Ebbesen, 1970). The affective component refers to evaluation based on feelings; the cognitive component is based on knowledge; and, the behavioral component refers to action taken (Kamradt & Kamradt, 1999; Simonson & Maushak, 1996; Simonson, 1979).

Research has shown that positive attitudes can benefit learners, industry (Bizjak, Knezevic, & Cvtrenzik, 2010), and society (Wilson, 2007), and attitudinal learning is a critical goal within learning contexts (Gagne et al., 1992). Nevertheless, there is limited research on specific instructional strategies for attitudinal learning (Daruwalla & Darcy, 2005; Simonson & Maushak, 1996; Simonson, 1979). Strategies that have been proposed for effective attitudinal learning include targeting the cognitive component by presenting new information (Bodenhausen & Gawronski, 2013), targeting the affective component by emotionally arousing learners (Kamradt & Kamradt, 1999; Simonson, 1979), and targeting the behavioral component by

having learners act in a way slightly different than their existing attitudes and more in line with the target attitude (Kamradt & Kamradt, 1999). Instructional strategies targeting all three attitudinal components can be the most effective (Kamradt & Kamradt, 1999). Our previous studies examining instructional design for attitudinal learning in MOOC environments found a variety of instructional strategies often combined to target multiple facets of learner attitudes, with some designs focusing primarily on affective and behavioral instruction (Watson, Loizzo, et al., 2016) while others focused on cognitive interventions (Watson, Kim, et al., 2016). Instructional strategies have included practicing targeted behaviors, such as in the MOOC examined in this study, projects focused on raising awareness and convincing others (Watson, Kim, et al., 2016), and discussing and collaborating with peers (Watson, Loizzo, et al., 2016). Several studies have also indicated that learners found MOOC instructional videos as the most effective strategy, perhaps due to learner expectations regarding instruction in MOOCs (Watson, Loizzo, et al., 2016; Watson, Kim, et al., 2016).

3. Purpose

This study sought to explore a MOOC designed for attitudinal learning in order to better understand the relationships between learner gender, age, education level, certification type, purpose for enrolling, most impactful course activity, and perception of attitudinal learning. By examining these learner variables, we wanted to explore if any particular aspects of learners correlated with learning outcomes or preferences for instruction to inform instructional design decisions for attitudinal learning MOOCs. We also sought to investigate the effects that different instructional activities had on learner perceptions of attitudinal learning in order to draw conclusions on what design choices were most impactful, including for different attitudinal components. The specific research questions included:

1. How do learners' demographic characteristics (e.g., gender, age, education level), enrollment purpose, and perception of most impactful instructional strategy relate to their:
   - perceptions of Attitudinal Learning (affective, behavioral, cognitive learning)
   - course satisfaction
   - performance scores (weekly happiness self-assessment as reflective practice, quiz, midterm and final exams, final grade)
2. How can learners' engagement levels and patterns of engagement be categorized based on their self-assessment of happiness as reflective practice?
3. To what extent can these profiles predict and be predicted by MOOC learners' demographic characteristics and perceptions of attitudinal learning?
4. What barriers to course engagement do MOOC learners encounter and what strategies enable them to engage in attitudinal learning activities?

4. Methods

4.1. Research design

The study was conducted as a sequential explanatory mixed method study (Clark & Creswell, 2011, p. 2014), consisting of an online survey followed by in-depth interviews (see Fig. 1). The researchers did not hold any affiliation to the MOOC institution or the platform. Institutional Review Board (IRB) approval was obtained prior to conducting the study.

4.2. Description of MOOC

A center for happiness research at a renowned university offered a MOOC on the Science of Happiness (SOH) targeting attitudinal learning during the fall semester of 2015 via the edX MOOC platform. The course had the following objectives: (a) Define happiness in a manner that is consistent with scientific evidence, (b) Identify key psychological, social, and biological factors that relate to happiness, (c) Understand the relationship between happiness, human connection, and "pro-social" qualities, such as compassion, altruism, and gratitude, (d) Explain why engaging in or practicing certain kinds of activities can
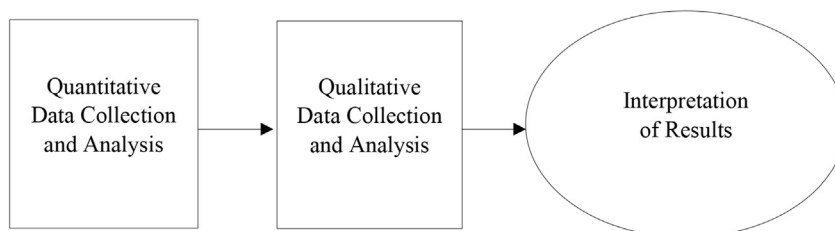

Fig. 1. Sequential exploratory design (Clark & Creswell, 2011, p. 2014).

boost happiness, (e) Apply lessons from positive & social psychology to their personal and professional lives, enhancing their self-understanding, and (f) Practice research-tested techniques for boosting their own happiness.

The MOOC was a ten-week course that was designed and taught by a team of two instructors, a course producer, and three teaching assistants. Online learner discussions, video lectures, quizzes, reading materials, as well as other exercises and resources were included in this MOOC. Mid-term and final exams were required to obtain a certification of completion. There were 53,491 registered learners in the course, representing 191 countries, with the largest number from the United States (33.9%), India (6.6%), the United Kingdom (4.8%), and Canada (4.2%). Course learners included 59% female and 41% male learners. 22% were younger than 25 years old, 44% were between 26 and 40, and 34% were over 41.

Our study participant sample consisted of 46 males (37%) and 78 females (63%). The majority of the learners were Caucasian (85%), between the ages of 25–64 years, and had an undergraduate (33%) or graduate (57%) degree as their highest earned degree. 61% of our participants reported taking the MOOC for an Honor certificate. Honor certificates were given to learners who completed the course assignments satisfactorily without formal university certification. The Verified certificate was granted to learners who completed the course assignments satisfactorily and paid a small fee to receive a formal certificate recognized by the university. Approximately 57% of the participants reported enrolling in the MOOC to learn more about the course topic in general (superficial interest), 43% reported enrolling to formulate a new viewpoint about the course topic (deeper interest). As the most impactful learning activity in the MOOC, 69% of participants reported instructor-led activities (such as readings, lecture slides/videos) while 32% reported exploratory activities (such as discussion, self-reflection on happiness, group work).

4.3. Data collection and analysis

4.3.1. Quantitative data

The research team contacted the MOOC instructor via email and solicited the participation of SOH learners through an announcement in the course. Of the 53,491 registered learners, 124 completed all survey measures: 1) a survey measuring perceptions of attitudinal learning which consisted of cognitive learning (4 items), affective learning (4 items), behavioral learning (4 items) (Watson, Loizzo, et al., 2016); and 2) a survey including students' demographic information (e.g., gender, age, education level), MOOC enrollment purpose (2 items), perception of most impactful activity (2 items), and course satisfaction (10 items). In addition the survey participants were asked to choose their enrollment purpose between "to learn more so I could formulate a new viewpoint" and "earn a formal certification of completion for work"; and choose the most impactful learning activity in MOOCs between instructor-based lecture (e.g., reading, lecture slides/videos) and exploratory activities (e.g., discussion, self-reflection, group work).

The Attitudinal Learning survey was developed by the authors (Watson, Loizzo, et al., 2016) based on cognitive dissonance theory (Festinger, 1962) to measure attitudinal learning and consisted of cognitive learning (3 items), affective learning (3 items), and behavioral learning (2 items) (Daruwalla & Darcy, 2005; Kamradt & Kamradt, 1999).

The *Cognitive Learning* subscale (e.g., "I became more knowledgeable about this topic") reflects one's cognitive acceptance of the course topic. The *Affective Learning* subscale (e.g., "I felt comfortable expressing my opinion about the MOOC topic") reflects one's degree of comfort with different opinions about the course topic. The *Behavioral Learning* subscale (e.g., "I found myself making changes in my behavior related to the course topic") assesses intended behaviors toward performing something related to the course topic. To assess learners' satisfaction about the course, 10 items with a 6-point Likert scale were used. A sample item is "Learning within the course was engaging".

The MOOC had four major learning activities: weekly happiness self-assessments (check-ins), weekly quizzes (problem sets), mid-term exam, and final exam. Students' final grades were obtained at the end of the course from the MOOC learner records via administration login.

To investigate the first research question, a series of t-tests and one-way analysis of variance (ANOVA) test was conducted using SPSS 20. Learners' gender, age, education level, enrollment purpose, and perception of the most impactful activity in the MOOC were selected as independent variables, while learners' performance scores (weekly happiness self-assessment, quiz, midterm and final exams, final grade) and perceptions of attitudinal learning (the mean total score of attitudinal learning, affective learning, behavioral learning, cognitive learning), and course satisfaction were selected as dependent variables (please see Appendix for complete survey items).

To examine research questions 2 and 3, a latent profile analysis (LPA) was performed using the 10-week happiness self-assessment scores of the 124 participants using Mplus 6. Latent modeling focuses on the individual patterns of characteristics relevant to the issue under consideration, by modeling unobserved population into meaningful clusters with distinctive patterns (Marsh, Lüdtke, Trautwein, & Morin, 2009; Pastor, Barron, Miller, & Davis, 2007). Particularly, LPA allows use of continuous indicators in derive clusters that are homogenous within profiles and heterogenous between profiles (Gabriel, Daniels, Diefendorff, & Greguras, 2015). Differences between profile models were tested using model-fit-indices: for instance, the Akaike Information Criterion (AIC), the Bayesian Information Criterion (BIC), the adjusted Bayesian Information Criterion (aBIC), the Lo-Mendell-Rueben (LMR) test and Entropy. Lower values for the AIC, BIC, and aBIC indicate a better-fitting model. A model with a significant LMR between k and k-1 profile models is sought and Entropy values closer to 1 are preferred, indicating better profile separation. Profile proportions and conditional item probabilities were examined with practical interpretation (Kim, Nam, Oh, & Kang, 2016).

4.3.2. Qualitative data

Of the 124 learners who participated in the survey, 12 participants agreed to be interviewed regarding their perceptions and experiences in the MOOC. Six interview participants were from the 'happy and increasing happiness' group and six were from the 'unhappy and declining happiness' group based on our profile analysis (Table 1).

A semi-structured interview protocol (Table 2) was used with open-ended questions (Edwards & Holland, 2013) to ask learners about their learning experiences. The interview protocol included self-introduction, description of self-approach to learning in the MOOC, the purpose and goal of enrolling, motivation, participation, change of perceptions, positive and negative aspects of the course, and their opinions of successfulness in the course. Interviews were conducted through Skype and telephone and were audio recorded.

During the data analysis phase, interview data were transcribed and coded. Then, data were divided into meaning units and compared with the initial codes. Structural analysis was used to identify, organize, and categorize themes in order to conduct comparison between the participants' points of views about the Science of Happiness MOOC and to cross-check across the interview data (Glaser, 1965). For reliability, three researchers coded the data independently and then compared the coded results, discussing the results to reach consensus and attain accuracy of study findings (Creswell, 2014). Finally, results and interpretations were shared with participants to obtain approval.

5. Results

5.1. Preliminary analyses

Table 3 presents descriptive statistics of scales. Response scales for the total attitudinal learning, affective learning, behavioral learning, cognitive learning, and course satisfaction, ranged from 1 (strongly disagree) to 6 (strongly agree). Scale averages are reported for these variables to aid cross-scale comparison. Cronbach's alpha of the total attitudinal learning survey was 0.89 and each subscale was 0.87, 0.84, and 0.82, respectively. Cronbach's alpha of course satisfaction was 0.84. All scales demonstrated good internal consistency with the current sample (n = 124). Correlations were examined to check the strength of the relationships among the variables of interest, and the results revealed that happiness self-assessment correlated moderately with course performance scores (quiz, mid-term, and final exam) and correlated highly with total attitudinal learning, as well as its three subscales. However, there was no correlation between learners' actual performance scores (quizzes, mid-term, and final exams) and attitudinal learning variables (cognitive, affective, behavioral learning, and the total). Course satisfaction correlated moderately with reflection and highly correlated with all the attitudinal learning variables.

5.2. Comparative analyses

There were no significant age, ethnicity, education, or enrollment purpose differences between learners' actual performance scores and perceptions of attitudinal learning. However, gender had significant effects on final exam scores (t = 2.017, p < 0.05), total attitudinal learning (t = −1.940, p < 0.05), and course satisfaction (t = −2.102, p < 0.05). Males demonstrated higher scores on the final exam (M = 88.48, SD = 0.39) than females (M = 82.60, SD = 0.23); while, females reported significantly higher overall attitudinal learning (M = 5.60, SD = 0.42) and course satisfaction (M = 5.40, SD = 0.43) than males (M = 5.17, SD = 0.74; M = 5.02, SD = 0.85, respectively) (Table 4).

The type of MOOC certification revealed significant effects on final exam score (t = 3.013, p < 0.01), final grade (t = 2.793, p < 0.01), attitudinal learning (t = −1.6999, p < 0.05), and affective learning (t = 1.884, p < 0.05). Learners who received honor (free) certificates outperformed those who received verified certificates, while those with verified (paid) certificates had higher perceptions of attitudinal learning gains, particularly in the area of affective learning (Table 5).

Table 1
Interview participants demographics.

Name	Age	Gender	Nationality	Profession	Profile
Bob	NA	Male	USA	Energy Data Analyst	Happy and increasing happiness
Ava	NA	Female	USA	Retired Zoologist	
Jon	43	Male	Canada	NA	
Carla	NA	Female	Mexico	Home Keeper	
Pilar	NA	Male	Mexico	Undergraduate in Marketing/Communication	
Don	71	Male	USA	Biologist, Psychiatrist	
Joe	62	Male	USA	Retired Teacher	Unhappy and declining happiness
Nigel	69	Male	USA	Retired Finance Director	
Sandra	NA	Female	USA	Tax Consultant	
Kenny	46	Male	England	Businessman	
Kara	66	Female	Colombia	Industrial Engineering/Economist	
Joann	NA	Female	USA	Clinical Social Worker	

Table 2
Semi-structured interview questions.

1. Tell me about yourself.
2. How would you describe your approach to learning in a MOOC?
3. Why did you take the MOOC? What were your goals for the MOOC?
4. As you worked on the course, did you feel more or less motivated to work on the course? Why?
5. How did you decide what activities to participate in or complete in the course?
6. How did the reflection/check-ins/mid-term/final exam activities help in your work in the course?
7. Did your perceptions of happiness change as you worked on the course? How?
8. How did your participation in this MOOC compare to your participation in any previous MOOCs that you've taken?
9. What was the most positive aspect of the course for motivating you to learn?
10. What was the most negative aspect of the course for motivating you to learn?
11. Do you consider your experience with the MOOC successful? Why or why not?

Table 3
Zero-order correlation coefficients among variables (n = 124).

Variables	1	2	3	4	5	6	7	8	9	10
1. Reflection	1									
2. Quiz	0.301[**]	1								
3. Midterm Exam	0.270[**]	0.739[**]	1							
4. Final Exam	0.210[*]	0.691[**]	0.674[**]	1						
5. Final Grade	0.279[**]	0.868[**]	0.882[**]	0.922[**]	1					
6. Course Satisfaction	0.296[**]	0.020	-0.024	-0.053	-0.028	1				
7. Total Attitudinal Learning	0.251[**]	0.078	0.078	-0.002	0.047	0.657[**]	1			
8. Cognitive Learning	0.210[*]	0.120	0.037	0.051	0.070	0.595[**]	0.796[**]	1		
9. Affective Learning	0.217[*]	0.033	0.108	-0.043	0.025	0.378[**]	0.802[**]	0.436[**]	1	
10. Behavioral Learning	0.187[*]	0.055	0.036	0.004	0.029	0.660[**]	0.842[**]	0.440[**]	0.440[**]	1

[*]$p < 0.05$, [**]$p < 0.01$.

Table 4
Independent sample T-Test between gender, performance score, attitudinal learning, and satisfaction.

Variable	Gender	Mean	SD	t	p
Final Exam	Male	88.48	0.39	2.017	<0.05
	Female	82.60	0.23		
Total Attitudinal Learning	Male	5.17	0.74	−1.940	<0.05
	Female	5.60	0.42		
Course Satisfaction	Male	5.02	0.85	−2.102	<0.05
	Female	5.40	0.43		

Note: males (n = 46), females (n = 78).

Learners' enrollment purpose had no significant effect on all of the dependent variables, such as performance scores, attitudinal learning, and course satisfaction; however, their preferred learning activities had a significant effect on behavioral learning ($t = -2.450$, $p < 0.05$) and course satisfaction ($t = -2.111$, $p < 0.01$). Learners who perceived exploratory activities (e.g., discussion, self-reflection, group work) as impactful activities had high perceptions of behavioral learning gains (M = 5.48, SD = 0.37) and were highly satisfied with the course (M = 5.48, SD = 0.39) compared to those who chose instructor-led activities (e.g., readings, lecture slides/videos) (M = 5.35, SD = 0.582 M = 5.21, SD = 0.70, respectively) as impactful activities (Table 6).

Table 5
Independent sample T-Test between MOOC certificate type, performance score, attitudinal learning, and satisfaction.

Variable	Certificate	Mean	SD	t	p
Final Exam	Honor	88.83	0.08	3.013	<0.01
	Verified	79.59	0.28		
Final Grade	Honor	89.41	0.07	2.793	<0.01
	Verified	81.82	0.22		
Total Attitudinal Learning	Honor	5.23	0.65	−1.699	<0.05
	Verified	5.71	0.38		
Affective Learning	Honor	5.06	0.85	−1.884	<0.05
	Verified	5.56	0.68		

Note: honor certificate (n = 75), verified certificate (n = 49).

5.3. Latent profile analysis: quantitative results

Based on the 10-week reflection scores as indicators, a latent profile analysis (LPA) was applied to the data to classify the MOOC learners into several clusters. Table 7 shows the fit statistics for Models 2 through 5. The two-profile model (shown in bold in Table 7) was chosen because it had the best fit and the highest level of separation so that it was interpretable with differentiated patterns and ample profile size. The term "model" means a statistical model that relates a set of continuous variables (the survey items of Attitudinal Learning) to a set of latent categorical variables (learner profiles).

Table 7 includes the four different statistical models that we tested out in order to find out the best number of clusters (learner profiles) with our sample. The model fit indices addressed in the table were used to assess the fit of each model. For instance, Model "n" means that we assessed the model fit, when assuming "n" clusters emerged from our sample.

Fig. 2 shows the two-profile model, including the estimated mean values for each week's self-assessment on perceived level of happiness score by each profile. Overall, Profile Class 1 (n = 110, 89%) holds a relatively high-level happiness perception, with an increasing trend along the way, so it was labeled as 'happy and increasing happiness'. Profile Class 2 (n = 14, 11%) consists of learners perceiving a low level of happiness, and indicating a declining trend, so it was labeled as 'unhappy and declining happiness'.

A series of independent sample t-tests and chi-squares were performed to examine profile differences in other performance scores and perceptions of attitudinal learning. Both profile groups exhibited quantitative similarities in other course performance scores (quiz, midterm and final exams, final grade) and in perceptions of attitudinal learning (cognitive, affective, behavioral learning), despite different trends in self-assessed happiness scores over time. Yet, the group of 'happy and increasing happiness' learners (M = 5.07, SD = 0.64) reported a significantly lower level of course satisfaction than the group of 'unhappy and declining happiness' learners (M = 5.56, SD = 0.40): t = 1.616, p < 0.01. Chi-square tests revealed that there were significant associations between profile and certificate type [χ^2 (1, n = 124) = 6.920, p < 0.001, phi = 0.23] as well as between profile and perception of impactful learning activity [χ^2 (1, n = 124) = 4.326, p < 0.05, phi = 0.19] (Table 8).

Of the 14 participants of the 'unhappy and declining happiness' group, 13 had an Honor certificate, which was higher than the expected number of 8. In addition, 13 out of the 14 learners in this profile group chose instructor-based lecture as the most impactful activity in MOOCs, which is higher than the expected number 9. This means that those who took a MOOC for free and those who endorsed instructor-led activities in the MOOC were less likely to consider themselves happy. In contrast, those who paid for a MOOC and those who preferred exploratory activities in the MOOC tended to feel happy with increasing positive feelings over time.

5.4. Qualitative results

5.4.1. Personal learning goals

Goals and motivation. Within both learner profile groups, knowledge gain was the most common cited goal of enrollment. The majority of happy and increasing happiness learners noted that they were looking for information, knowledge, or thoughts that can assist them to understand happiness. For the unhappy and declining happiness learners, several joined the course to gain knowledge and techniques that may assist them for "professional development" (e.g. to help their clients pursuing happiness), as well as to improve their own happiness.

One interesting contrast between the two groups was the way learners reported their selection of using materials and activities in the course. The low happiness learners reported that they were "more selective in [their] personal learning approaches," while the high happiness group was more inclined to "follow the course sequence and instructions that the instructors provided" as recommendations.

Previous experience with the topic was another theme among learners. Prior knowledge motivated learners to be engaged in the activities. One learner shared that "connecting prior life experiences with the scientific evidence behind happiness research was a driving motivator" which promoted engagement.

Low stakes learning. Most learners generally approached the MOOC with low stakes learning. For example, several learners categorized MOOC learning as another form of entertainment (similar to TV), while others enrolled to fill-in their free time with productive activities.

Some learners even wondered whether this MOOC could be considered a "course", viewing it as "self-introspection" or "self-assessment". Most did not consider grades to be an important factor. Learners focused mainly on enhancing knowledge and obtaining "skills and techniques that would assist them to living a happy everyday life".

Table 6
Independent sample T-Test between perception of impactful learning activity in MOOCs, performance score, attitudinal learning, and satisfaction.

Variable	Impactful Activity	Mean	SD	t	p
Behavioral Learning	Instructor-led	5.35	0.82	−2.450	<0.01
	Exploration	5.72	0.50		
Course Satisfaction	Instructor-led	5.21	0.70	2.624	<0.01
	Exploration	5.48	0.37		

Note: Instructor-based Lecture (n = 75), Exploration (n = 49).

Table 7
Latent profile model comparisons.

Profile	AIC	BIC	aBIC	LMR	Entropy
2	**234.227**	**146.798**	**244.822**	**520.022 (p < 0.05)**	**0.999**
3	461.646	343.194	476.000	244.802 (p = 0.36)	0.919
4	439.646	290.171	457.760	0.000 (p = 0.82)	0.757
5	594.970	414.472	616.843	47.183 (p = 0.90)	0.916

Note. AIC: Akaike Information Criterion (Lower = Better); BIC: Bayesian Information Criterion (Lower = Better); aBIC: the adjusted BIC (Lower = Better), LMR: Lo-Mendell-Rueben (with good model fit indicated by p < 0.05), Entropy (Closer to 1 = Better).
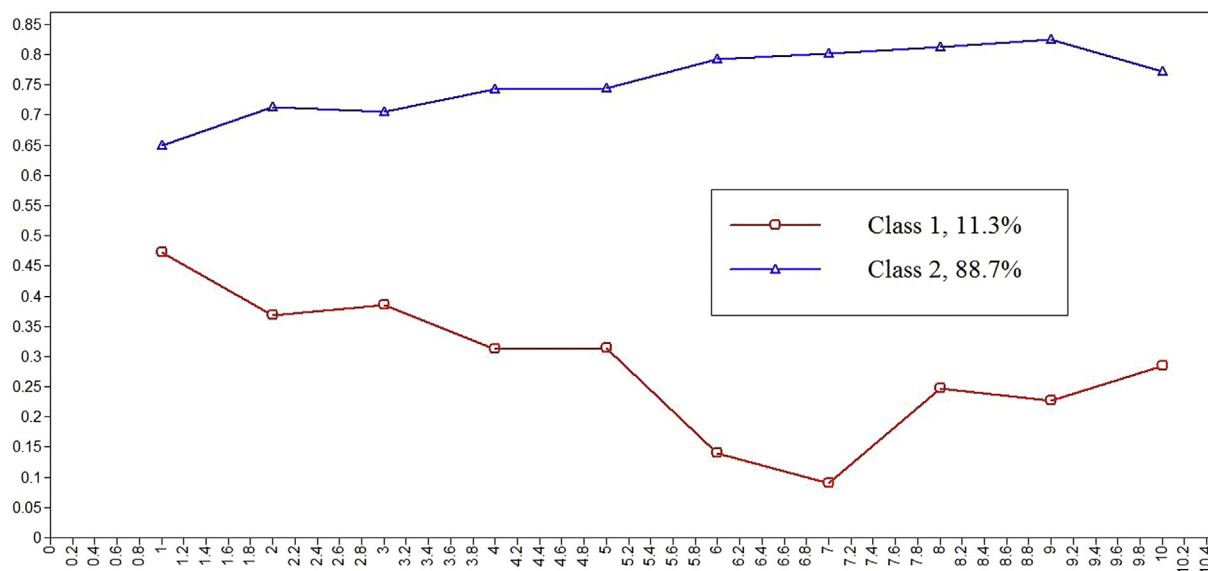

Fig. 2. Latent profiles for the 2 different groups.

Table 8
Chi-square values applied to the two distinctive profiles of MOOC learners related to gender, age, education level, certificate type, enrollment purpose, perception of impactful learning.

Variable	χ^2	df	p
Gender	1.126	1	0.289
Age	2.933	5	0.710
Education Level	0.219	4	0.994
Certificate Type	6.920	1	<0.01
Enrollment Purpose	0.318	1	0.573
Impactful Activity	4.326	1	<0.05

Professional development. Participants shared how they enrolled in the MOOC to increase and sharpen their knowledge and skills needed in their careers. For instance, one explained how "it would be useful to utilize the obtained skills and techniques in my personal consulting business". A social worker, mentioned that she "will be using the strategies with clients to guide them in their pursuit of happiness". Participants who sought professional development within the course shared that they were motivated throughout the course.

5.4.2. Perceptions of learning gains and instructional activities

Cognitive learning. Learners from both profile groups shared highly positive reactions to the course's effectiveness in cognitive learning. Only one learner in this group claimed that there was no change in their cognitive knowledge due to existing familiarity with the topic. All other high happiness learners confirmed the change of their knowledge and perceptions. For example, one participant said information helped increase his cognitive ability to think deeply, making him "sit down and look at it a little bit harder". Another high happiness participant mentioned specific techniques assisted him to increase his personal happiness. The low happiness group learners shared their perceptions of happiness changed primarily due to new information presented in the course, with only two participants indicating that the course only reinforced their existing knowledge.

Affective Learning. Learners described videos as the most important aspect in facilitating affective learning, sharing that they were "inspiring elements that motivated" them to emotionally engage. In particular, the instructors' video communication seemed to effectively connect with learners, as many commented on how passionate and sincere the instructors came across in the videos, for example noting, "I loved their spirit and enthusiasm …".

Learners also found the learning activities to be personal, in-depth and impactful. One learner shared that she found the course to be a "rollercoaster of emotions". Learners from both groups emphasized the appreciation for the reflective exercises and reflections in the course.

Behavioral Learning. Participants shared that they joined the course with the intention of tangibly improving their happiness level and indicated that there had been specific behavioral changes in their lives due to the course. Examples included how they started to "change their daily routines at home with the kids", how they "increased interactions" with others, and how they had started to "develop a healthier lifestyle" after taking the course.

Course Design. Overall, learners cited the clear course design and organization of the content as keeping them on track and motivated. The three major course components that were discussed by interview participants were lecture videos, reflective exercises, and the Facebook community.

The lecture videos were considered highly engaging, and participants also indicated the usefulness of the "ability to speed up or slow down the video lectures" provided by the MOOC platform.

The course exercises and reflections (such as meditation and mindfulness) were powerful in changing the learners' daily lives. One high happiness learner shared that "these activities helped us to practice our kindness and helped us become more aware of the fact that we are the only ones responsible for our happiness".

Finally, learners described their experiences with the discussion forums. Learners noted that the lack of clear discussion topics was ineffective. However, they shared that they, "were appreciative of the Facebook page the instructors had set up" for MOOC learners. The Facebook page was highly active with learners sharing life goals, life experiences, and inspiring resources related to happiness.

5.4.3. Challenges in the course

Large content. There were also some challenges in regards to the MOOC. Learners discussed the 10-week course as overwhelming. Learners found the course work to be quite substantial, which pressed them to be more "selective in their activities and exercise choices". One of the learners noted, "I think what I didn't expect was how many hours a week the class took".

The 10-week timeline also caused some learners to feel rushed in their learning approach. Learners shared that they felt pushed to finish the course assignments to get the course completed in time. Most interview participants reported that were not able to consider the extra materials provided in the course due to their personal scheduling and other family or work commitments.

Discussion Forum. The discussion forum was a large barrier in the course as well. The massiveness of the discussion forum prevented learners from engaging-as one learner described: "there were a few times where they asked you to reflect and because there were, I think, thousands of people taking the course, and you could never really get into a conversation with anybody about any particular aspect". The second challenge in the discussion forum was the conflicts that occurred among learners. A learner was afraid of participating in the discussion forum to avoid any kind of conflict with others. These participants mentioned that they joined the MOOC to increase their knowledge about the topic, and not to get involved in "arguments about issues related to happiness".

6. Discussion

In this study, we investigated whether learners' demographic characteristics and perceptions related to the MOOC correlated with differences in their performance scores and perceptions of attitudinal learning. Our results indicated that weekly self-assessment of "happiness" significantly correlated to students' performance achievements, as well as their perceptual changes in attitudinal learning. We speculate that self-assessment as reflective practice provided an authentic context for learners to engage in attitudinal learning toward the course topic, thereby learning firsthand knowledge and practices related to happiness. These speculations clearly warrant additional work.

Interestingly, our comparative results showed that learner performance was significantly higher for learners pursuing an honor certificate, as opposed to verified. One could hypothesize that those with a monetary investment in the course might be expected to perform better, but we found the opposite. However, those with verified certificates perceived greater learning gains, particularly with affective learning.

The two profiles revealed by our latent profile analysis, besides differing in MOOC satisfaction, also differed in that the unhappy group largely were pursuing honor certificates and preferred instructor-lead activities, while those pursuing verified certificates preferred exploratory activities reported higher levels of happiness. These findings align with prior literature on MOOC learners, learner profiles, and how learners engage with MOOCs. Our participants confirmed prior findings that learners often approach learning through a MOOC in a non-formal way or even as entertainment. This included self-directed sequencing and browsing of course content (Guo & Reinecke, 2014); and motivation to complete personal goals as opposed to course completion (Littlejohn et al., 2016).

Littlejohn et al. (2016) also found that learners with low self-regulated learning (SRL) were more likely to pursue earning a certificate of completion rather than just "browsing" the course. And while our study did not examine learner SRL, it did find that the happier learner profile did pursue more self-directed learning strategies than the low happiness profile students. Although learners in both profiles did take the course for professional development purposes, it is possible that the happier profile pursued more verified certificates in order to utilize the certificates for professional certification purposes all the while focusing their learning efforts on more self-directed approaches to the instruction. The unhappy group meanwhile may have taken the course out of more general, unfocused interest such as trying to deal with existing unhappiness rather than for professional purposes. Furthermore, the unhappy profile students preferred more formal, instructor-lead instructional strategies and reported significantly higher course satisfaction. This contrasts the Littlejohn et al. (2016) study which found that learners who took a more formal approach, trying to complete all course requirements and following instructor direction reported lower levels of satisfaction.

Our comparative analysis also found that learners who preferred exploratory learning activities (discussion, self-reflection, group work) had significantly higher course satisfaction than those preferring instructor-lead activities; although, overall course satisfaction was high. So while our unhappy profile learners preferred instructor-lead activities, they had a higher course satisfaction perception than the happy profile learners, which contrasts with the comparative analysis that takes into account all learners in the sample, not just those adhering to one of the two profiles. This could perhaps indicate that while the unhappy students' happiness rates declined, they recognized and appreciated how the course was helping them to recognize their level of happiness while providing them with concrete strategies to improve, even if those strategies might not be working for them during the course. This is supported by our qualitative analysis which found learners in both profile groups rated the course positively and commented on the sense of connection they felt with course instructors while indicating that they changed behavior as a results of the course. It is possible that the learners who initially rated themselves as happy and saw their happiness levels improve perceived less of an impact given that they initially perceived themselves as happy; while the unhappy profile learners, despite seeing their happiness levels decline, nevertheless recognized the potential future impact the course could have on them as they refined their ability to self-evaluate their happiness and apply learned strategies and therefore rated the course higher.

Ultimately, attention must be given to exploring a variety of instructional design decisions and instructional strategies and choices when considering different learner profiles, goals and expectations. We did find differences based on learner certificate types and preference for exploratory or instructor-lead activities. While our study examined learners who have completed the course, other learner profile studies have examined a variety of learner engagement types (Ferguson et al., 2015; Hood, Littlejohn, & Milligan, 2015; Littlejohn et al., 2016). Consideration needs to be given to how learners prefer to learn as well as their varying goals for learning.

7. Implications, limitations, and future research

While a single case study approach can limit generalizability of results, we have identified several implications for the instructional design of MOOCs for attitudinal learning. Furthermore, these implications could also inform the design of MOOCs in general. Learners seemed unconcerned about formal course grades, and this was reflected statistically with no correlation between scored items (quizzes and exams) and perceived learning. In contrast to this, learners praised the ungraded happiness self-reflection exercises which correlated highly with perceived learning, and ultimately served as a holistic assessment of the targeted attitude outcome (happiness). This highlights for designers that unlike traditional courses where students may be motivated by formal course outcomes and grades, this is not indicated in MOOCs where the course is viewed more as entertainment, and learner motivation is more likely to be intrinsic and self-directed than aligned with the extrinsic nature of grades – an implication confirmed by learner interviews and reflected in other studies (Loizzo & Ertmer, 2016; Milligan & Littlejohn, 2017). Furthermore, this holds true even those paying for verified certificates may be less motivated by grades in the MOOC context where learning outcomes are more self-directed as those pursuing verified certificates reported more learning but had lower course exam scores and grades than those pursuing honor (free certificates).

Another important takeaway from the learner interviews that instructional designers must consider is that learners are taking the course largely for their own enjoyment. Therefore, it is important to consider the length and difficulty of courses as learners expressed frustration with both, noting the course's length created challenges and their own personal commitments prevented them from exploring any more than the required course materials, forcing them to not consider additional provided resources. Designers should consider self-paced MOOC offerings that allow learners to proceed at their own pace given the themes of MOOCs as entertainment and the preference for self-directed activities by some of the learners.

Instructional designers should also consider the role of discussions in MOOCs. Frustration with the discussion boards has been a common theme in our previous studies on attitudinal learning MOOCs (Watson, Loizzo, et al., 2016; Watson, Kim, et al., 2016; Kim, Watson, et al., 2016; Watson, Watson, Richardson, & Loizzo, 2016; Watson, Watson, Janakiraman, & Richardson, 2017) and were also reported here. Careful consideration must be given to make them productive if included, and to mitigate the limitations of the platform. Establishing a facilitation team to elevate interesting conversations and promote the sense of instructor presence can be important. Furthermore, establishing a clear code of conduct in discussions and enforcing them can also play an important role in making learners feel safe to participate in discussions (Watson et al., 2017) as some learners expressed reservations about participating due to conflict on the boards.

This study has several limitations. First, our study utilizes self-reported survey and interviews as data that were collected after the completion of the MOOC (Ericsson & Simon, 1993). We examined 129 learners who voluntarily completed the post-course survey and 12 (of the 129) individuals who were later interviewed more in-depth. This number is a small sample of the total enrollment (53,491). In addition, given that the survey was voluntary and the 129 participants were all learners who had successfully completed the course (60% or higher completion of activities), the learners who participated in the survey may have been more likely to have had positive learning experiences with the MOOC. Future research studies should include learners that failed to complete the course, in order to better understand learners who did not find the MOOC useful.

Second, our methodology for studying attitudinal learning needs further consideration, as without a pre and post comparison of attitudes, it is difficult to obtain an accurate examination of the true learning gains, and a pre-course survey could provide a basis for comparison. Implementation of a pre-course survey instrument would support accurately measuring how learners feel about the topic prior to engaging in the MOOC learning experience.

Finally, there is a possibility that the learner performances within the course and opinions of their learning were influenced by their psychological experiences of various other factors (Terras & Ramsay, 2015). These factors may include their personal circumstances while they were taking the course or their prior experiences with the MOOC platform's usability/visual design. These factors were not explored in this study and future research studies will need to investigate how these aspects may influence learning, particularly within a MOOC setting.

Additional future research should also consider how to compare the impact of instructional design choices for attitudinal learning in different contexts. One way to approach this would be to develop a general instrument that assesses attitudinal learning outcomes and ties them to specific instructional design choices.

Appendix

Demographic Information
1. Gender: Male, Female
2. Age: Under 17 years old, 18–24, 25–34, 35–44, 45–54, 55–64, 65–74, 75 or older
3. Ethnicity: White, Hispanic, African American, Native American, Asian American, Pacific Island, Other
4. Education: high school, BA, Master, PhD, Missing
5. Certificate: Honor, Verified
6. Enrollment Purpose: Earn a formal certification of completion for work, career, or personal satisfaction/Learn more to so I could formulate a new viewpoint.
7. Impactful Activity: Instructor-lead (readings, lecture videos, quizzes, exams), exploratory (discussions, reflection, group project)
Course Satisfaction
1. Learning within the course was enjoyable.
2. Learning within the course was engaging.
3. Learning within the course was stimulating.
4. Learning within the course was exciting.
5. Learning activities and assignments were appropriate.
6. Learning activities and assignments were relevant.
7. Learning activities and assignments challenged my belief system.
8. Learning activities and assignments modified my belief system.
9. I completed learning activities.
10. I was active in learning activities.
Cognitive Learning
1. I learned new information about this topic.
2. I became more knowledgeable about this topic.
3. I was intellectually stimulated with new information about this topic.
4. I considered multiple aspects related to this topic.
Affective Learning
1. I felt comfortable expressing my opinion about the topic in the course.
2. I felt confident expressing my opinion about the topic in the course.
3. I felt comfortable expressing my opinion about the topic outside of the course.
4. I felt confident expressing my opinion about the topic outside of the course.
Behavioral Learning
1. I found myself considering the new information I have learned when making decisions related to the topic.
2. I found myself considering the new information I have learned when taking action related to the topic.
3. I found myself doing something related to this topic outside of this course that I have not done before.
4. I found myself making changes in my behavior related to this topic.

References

Adair, D., Alman, S. W., Budzick, D., Grisham, L. M., Mancini, M. E., & Thackaberry, A. S. (2014). Many shades of MOOCs. *Internet Learning, 3*(1), 7.

Balakrishnan, G., & Coetzee, D. (2013). *Predicting learner retention in massive open online courses using hidden Markov models*. Technical Report No. UCB/EECS-2013-109. Retrieved from. http://www.eecs.berkeley.edu/Pubs/TechRpts/2013/EECS-2013-109.html.

Beaven, T., Codreanu, T., & Creuzé, A. (2014). Motivation in a language MOOC: Issues for course designers. In M. Elena, & B. Elena (Eds.), *Language MOOCs: Providing learning, transcending boundaries* (pp. 48–66). Berlin: De Gruyter Open.

Bizjak, B., Knezevic, M., & Cvetreznik, S. (2010). Attitude change towards guests with disabilities: Reflections from tourism learners. *Annals of Tourism Research, 38*(3), 842–857.

Bodenhausen, G. V., & Gawronski, B. (2013). Attitude change. In D. Reisberg (Ed.), *The Oxford handbook of cognitive psychology* (pp. 957–969). New York: Oxford University Press.

Clarà, M., & Barberà, E. (2013). Learning online: Massive open online courses (MOOCs), connectivism, and cultural psychology. *Distance Education, 34*(1), 129–136.

Clark, V. P., & Creswell, J. W. (2011). *Designing and conducting mixed methods research.* Retrieved on July (Vol. 25).

Creswell, J. W. (2014). *A concise introduction to mixed methods research.* Thousand Oaks, CA: Sage.

Daruwalla, P., & Darcy, S. (2005). Personal and societal attitudes to disability. *Annals of Tourism Research, 32*(3), 549–570.

Dillahunt, T. R., Wang, B. Z., & Teasley, S. (2014). Democratizing higher education: Exploring MOOC use among those who cannot afford a formal education. *The International Review of Research in Open and Distributed Learning, 15*(5). Retrieved from http://www.irrodl.org/index.php/irrodl/article/view/1841.

Edwards, R., & Holland, J. (2013). *What is qualitative interviewing?.* Retrieved from http://eprints.ncrm.ac.uk/3276/1/complete_proofs.pdf.

Enger, K., & Lajimodiere, D. (2011). A multi-cultural transformative approach to learning: Assessing attitude change in doctoral learners following an online diversity course. *Multicultural Education & Technology Journal, 5*(3), 176–193.

Ferguson, R., Clow, D., Beale, R., Cooper, A., Morris, N., Bayne, S., et al. (2015). Moving through MOOCS: Pedagogy, learning design and patterns of engagement. In Tomaz Klobucar, & Grainne Conole (Eds.), *Design for teaching and learning in a networked world* (pp. 70–84). Switzerland: Springer International Publishing. Lecture Notes in Computer Science.

Festinger, L. (1962). *A theory of cognitive dissonance.* Stanford, California: Stanford University Press.

Flynn, J. (2013). MOOCS: Disruptive innovation and the future of higher education. *Christian Education Journal, 10*(1), 149–162.

Gabriel, A. S., Daniels, M. A., Diefendorff, J. M., & Greguras, G. J. (2015). Emotional labor actors: A latent profile analysis of emotional labor strategies. *Journal of Applied Psychology, 100*(3), 863.

Gagne, R., Briggs, L., & Wagner, W. (1992). *Principles of instructional design.* Belmont: Wadsworth/Thomson Learning.

Glaser, B. G. (1965). The constant comparative method of qualitative analysis. *Social Problems, 12*(4), 436–445.

Guo, P. J., & Reinecke, K. (2014). Demographic differences in how students navigate through MOOCs. In *Proceedings of the first ACM conference on Learning@ scale conference* (pp. 21–30). New York: ACM.

Hood, N., Littlejohn, A., & Milligan, C. (2015). Context counts: How learners' contexts influence learning in a MOOC. *Computers & Education, 91*, 83–91.

Kamradt, T. F., & Kamradt, E. J. (1999). Structured design for attitudinal instruction. In C. M. Reigeluth (Ed.), *Instructional design theories and models: A new paradigm of instructional theory* (Vol. 2, pp. 563–590). Mahwah, NJ: Lawrence Erlbaum Associates.

Kim, D., Nam, J. K., Oh, J., & Kang, M. C. (2016). A latent profile analysis of the interplay between PC and smartphone in problematic internet use. *Computers in Human Behavior, 56*, 360–368.

Kim, W., Watson, W. R., & Watson, S. L. (2016). Student perceptions of learning in three MOOCs: A case study of attitudinal change instruction. *Educational Media International, 53*(3), 168–183.

Kizilcec, R. F., Piech, C., & Schneider, E. (2013, April). Deconstructing disengagement: Analyzing learner subpopulations in massive open online courses. In *Proceedings of the third international conference on learning analytics and knowledge* (pp. 170–179). ACM.

Littlejohn, A., Hood, N., Milligan, C., & Mustain, P. (2016). Learning in MOOCs: Motivations and self-regulated learning in MOOCs. *The Internet and Higher Education, 29*, 40–48.

Loizzo, J., & Ertmer, P. A. (2016). MOOCocracy: The learning culture of massive open online courses. *Educational Technology Research and Development, 64*(6), 1013–1032.

Margaryan, A., Bianco, M., & Littlejohn, A. (2015). Instructional quality of massive open online courses (MOOCs). *Computers & Education, 80*, 77–83.

Marsh, H. W., Lüdtke, O., Trautwein, U., & Morin, A. J. (2009). Classical latent profile analysis of academic self-concept dimensions: Synergy of person-and variable-centered approaches to theoretical models of self-concept. *Structural Equation Modeling, 16*(2), 191–225.

Merrill, M. D. (2002). First principles of instruction. *Educational Technology Research and Development, 50*(No. 3), 43–59.

Milligan, C., & Littlejohn, A. (2017). Why study on a MOOC? The motives of students and professionals. *The International Review of Research in Open and Distributed Learning, 18*(2).

Park, Y., Yu, J. H., & Jo, I. H. (2016). Clustering blended learning courses by online behavior data: A case study in a Korean higher education institute. *The Internet and Higher Education, 29*, 1–11.

Pastor, D. A., Barron, K. E., Miller, B. J., & Davis, S. L. (2007). A latent profile analysis of college students' achievement goal orientation. *Contemporary Educational Psychology, 32*(1), 8–47.

Rodriguez, C. O. (2012). MOOCs and the AI-Stanford like courses: Two successful and distinct course formats for massive open online courses. *European Journal of Open, Distance and E-learning*, (1). Retrieved from http://www.eurodl.org/?p%3darchives%26year%3d2012%26halfyear%3d2%26article%3d516.

Simonson, M. R. (1979). Designing instruction for attitudinal outcomes. *Journal of Instructional Development, 2*(3), 15–19.

Simonson, M. R., & Maushak, N. (1996). Situated learning, instructional technology, and attitude change. In H. McLellan (Ed.), *Situated learning perspectives* (pp. 225–242). Englewood Cliffs, NJ: Educational Technology Publications.

Terras, M. M., & Ramsay, J. (2015). Massive open online courses (MOOCs): Insights and challenges from a psychological perspective. *British Journal of Educational Technology, 46*(3), 472–487.

Thomas, W. I., & Znaniecki, F. (1919). *The Polish peasant in Europe and America: Monograph of an immigrant group* (Vol. 3). Boston, MA: The Gorham Press.

Veletsianos, G. (2013). *Learner experiences with MOOCs and open online learning. Hybrid Pedagogy.* Retrieved from http://learnerexperiences.hybridpedagogy.com.

Watson, W. R., Kim, W., & Watson, S. L. (2016). Learning outcomes of a MOOC designed for attitudinal change: A case study of an animal behavior and welfare MOOC. *Computers and Education, 96*, 83–93.

Watson, S. L., Loizzo, J., Watson, W. R., Mueller, C., Lim, J., & Ertmer, P. (2016). Instructional design, facilitation, and perceived learning gains: An exploratory case study of a human trafficking MOOC for attitudinal change. *Educational Technology Research and Development, 64*(6), 1273–1300.

Watson, S., Watson, W., Janakiraman, S., & Richardson, J. (2017). A team of instructors' use of social presence, teaching presence and attitudinal Dissonance: An animal behavior and welfare MOOC. *International Review of Research in Open and Distance Learning., 18*(2), 68–91.

Watson, S. L., Watson, W. R., Richardson, J., & Loizzo, J. (2016). Instructor's use of social presence, teaching presence and attitudinal dissonance: A case study of an attitudinal change MOOC. *The International Review of Research in Open and Distributed Learning., 17*(3), 54–74.

Wilson, B. J. (2007). Designing media messages about health and nutrition: What strategies are most effective? *Journal of Nutrition Education and Behavior, 39*(2), S13–S19.

Yang, D., Wen, M., Kumar, A., Xing, E. P., & Rosé, C. P. (2014). Towards an integration of text and graph clustering methods as a lens for studying social interaction in MOOCs. *The International Review of Research in Open and Distributed Learning, 15*(5). Retrieved from http://www.irrodl.org/index.php/irrodl/article/viewFile/1853/3114.

Ye, C., & Biswas, G. (2014). Early prediction of learner dropout and performance in MOOCs using higher granularity temporal information. *Journal of Learning Analytics, 1*(3), 169–172.

Zimbardo, P., & Ebbesen, E. B. (1970). *Influencing attitudes and changing behavior: A basic introduction to relevant methodology, theory, and applications.* Reading, MA: Addison-Wesley Publishing Company, Inc.

Zimbardo, P. G., & Leippe, M. R. (1991). *The psychology of attitude change and social influence.* New York, NY: McGraw-Hill Book Company.