INSTRUCTIONAL DESIGN FOR ATTITUDINAL LEARNING IN A MOOC: LEARNER DEMOGRAPHICS, ENROLLMENT PURPOSE, AND PERCEPTION OF LEARNING ACTIVITIES

[1]SUNNIE LEE WATSON, [2]WILLIAM R. WATSON

[1,2]Purdue University, Purdue University
E-mail: [1]watson82@purdue.edu, [2]brwatson@purdue.edu

Abstract - In this mixed-method study,MOOC learners' perceptions of attitudinal learning was examined as well as the impact of learner demographics, enrollment purpose, and perception of the most impactful learning activity. Survey results were buttressed by interview data to gain additional insights.Learners' perspectives on instructional design choices and learning challenges were examined in addition to those of the instructor. Further, a series of hierarchical multiple regression analyses showed that age and ethnicity were the best predictors for affective learning gains; gender and perception of impactful activity for behavioral learning gains; and ethnicity, enrollment purpose, and perception of impactful activity for cognitive learning gains. Implications for the design and facilitation of instructional activities in MOOCs designed to enhance attitudinal learning, are discussed.

Index Terms - Attitudinal Learning, Instructional Design, MOOC.

I. INTRODUCTION

While Massive Open Online Courses (MOOCs) have gained attention as a potential disruptor of educational practices due to how they provide higher education at low cost to large and diverse global populations [1], they have traditionally been offered regarding science and technology disciplines [2]. However, increasingly course offerings in the social sciences have found their way onto MOOC platforms, including those targeting attitudinal learning outcomes. Dole and Sinatra [3] note that learner attitude plays a significant role in the learning of social topics as pre-existing attitudes can impact learning. Also, attitudinal learning has been identified as a core outcome in both school [4] and businesses [5].

Attitude has been defined as the psychological evaluation of a person, event, or object [4]. It has been described as having three components: affective, which describes evaluation based on emotion or feeling, cognitive, which describes evaluations based on knowledge and reason, and behavioral, which comprises the actions performed towards the subject of the attitude [6]. Instruction targeting attitudinal change or learning tries to create dissonance between the components, prompting the learner to change her attitude in order to reestablish balance. For example, introducing new information to a learner is the most common strategy [7], which helps establish the learner's mind as receptive to attitude change. Strategies that target the affective component provoke emotions [6] [8]. Asking the learner to perform an action aligned with the target attitude is a behavioral strategy [6].

This study examined a MOOC focused on attitudinal learning that utilized instructional strategies targeting all three attitudinal components. It examined the instructional design of the MOOC, as well as learner's perceptions of their learning in each component, while looking for potential relationships between learning outcomes and learner demographics, reasons for enrollment, and preferred instructional strategy.

II. METHODS

A mixed methods approach was utilized for this study. Qualitative data examined the instructional design of the MOOC. Quantitative data were used to analyze if learners' reason for enrolling in the MOOC and perception of instructional activities impacted their attitudinal learning games as well as if learner demographics, namely gender, age, or ethnicity impacted perceived attitudinal learning.

The first research question sought to understand how the MOOC was designed and facilitated for attitudinal learning and utilized instructor and learner interviews. The second research question examined the impact of learner's purpose for enrolling and preferred learning activity and whether it influenced their learning gains. This question was answered through an online survey in addition to the interviews. The final question examined how the learners perceived attitudinal learning differed based on gender, age, and ethnicity and again was based on the survey and interviews.

A. Description of the Setting

The MOOC under examination was about the Science of Happiness (SOH), an area of psychology that seeks to help people live happier lives. It was offered during the 2015 fall semester on the edX platform. The course described the following goals on its syllabus:

(a) Define happiness in a manner that is consistent with scientific evidence.

(b) Explain why engaging in or practicing certain kinds of activities can boost happiness.

(c) Apply lessons from positive & social psychology to their personal and professional lives, enhancing their self-understanding; and,

(d) Practice research-tested techniques for boosting their own happiness.

B. Instructional Activities

Course instructional activities included videos of instructor lectures, resources, including readings, discussion activities, and quizzes and exams. Learners who earned a grade of 60% or better based on two course exams could earn a free certificate of accomplishment. Optionally, students could pay a small fee to receive a certificate that verified their identity and completion. The course took place over ten weeks and was designed and offered by two instructors.

C. Course Participants

Of the two instructors, one was only active in the course videos while the other appeared in the videos and was also posted course announcements. Three course assistants facilitated the discussion forum and responded to learner emails. 53,491 learners from 191 countries registered for the course. 22% of learners were 25 years old or below, 44% were 26-41 years old, and 34% were age 41 or older. 59% of learners were female and 41% male.

D. Study Participants

Those participating in the study included the MOOC instructor who appeared in the video and posted course announcements, the director of a happiness research and outreach center at a University in the western United States. Additional participants were the learners who responded to our survey at the conclusion of the course. 792 registered students responded to the survey. While this is small percentage of the total amount who registered for the course, we believe that those who completed the course are most suited to answering questions regarding the course design. For this reason, the survey was only sent at the conclusion of the course. 69.1% of the respondents were female, and 76% were Caucasian. The age groups of respondents were largely well distributed, with just a few participants 17 years old or younger or 75 years old or older. 124 survey respondents indicated an interest in participating in an interview, with 20 following up and actually completing an interview.

E. Data Collection

Initially, the MOOC materials were reviewed to identify instructional design and facilitation choices, including the syllabus, videos, announcements, discussion prompts, exercises, and assessments. Secondly, interview data was collected. A 60 minute interview was conducted via Skype with the instructor in order to identify instructional design and facilitation intentions and approaches. 20 interviews were conducted with learners via Skype. All interviews utilized semi-structured, open-ended questions, and responses were audio-recorded and transcribed. Finally, responses from an author-created survey were collected. The survey had 12 items based on attitudinal learning literature. The questions utilized a 6-point Likert scale with 1 indicating "strongly disagree" and 6 indicating "strongly agree", with a 3 indicating "neither agree nor disagree".

Cronbach's alpha coefficients were .87 (Affective Learning), .90 (Behavioral Learning), and .89 (Cognitive Learning). Demographic characteristics (gender, age, ethnicity), course satisfaction (ten items, $\alpha = .87$), their reason for taking the MOOC, and what they perceived as most the impactful learning activity were also included. The reliability with Cronbach's α values of the course satisfaction was .78, in using this learner sample.

F. Data Analysis

Transcribed interviews were individually coded by 5 researchers who then triangulated the codes. Initial codes resulted in 34 total categories: 17 each for instructor and learner interviews. Each category contained between 3 and 7 codes. Structural analysis was applied in order to identify meaningful themes. Seven final themes were agreed upon by the research team: a) course design and course goals, b) student experiences and perceptions of the course and learning activities, c) importance and challenges with assessment, d) instructor experience and perception of the course, e) communication with instructor, d) improvements needed in the course, f) barriers related to MOOC platforms.

Survey responses were examined to calculate the mean, variance, and standard deviation of each survey item. To answer the research questions related to factors impacting perceived attitudinal learning, a series of multivariate analyses of variance (MANOVAs) were conducted. Preliminary assumption testing was conducted to check normality, linearity, univariate and multivariate outliers, homogeneity of variance-covariance matrices, and multicollinearity, with no serious violations noted [9].

III. RESULTS

While full results of the study are beyond the scope of this paper, summarized results are provided below and more detailed results will be provided at the presentation.

A. Instructional Design of the MOOC

1) Core Instructional Design Choices

a) Seamless Design and Roadmap Videos

A core design choice focused on facilitating learners' transition between topics through a seamless design. This was mostly realized through videos, highlighting what had been covered and what was being covered next, thus encouraging learners to continue, and giving detailed instructions for learning activities.

b) Reflection Exercises

Another instructional design focus was to offer learners research-based, practical exercises throughout the course for promoting happiness in their daily lives.

c) Discussion and Engagement

While discussions were ungraded, learners were encouraged to participate in discussions facilitated by

teaching assistants. The forums did not present specific questions, but instead asked learners' to share their experiences. Angela described the intent as, "not about studying, and not about answering questions. It is more about engaging and pondering and reflecting with others." Learner interviews indicated, however, that the discussion forums were challenging to use and "difficult to stay on track" due to the massive size of the class.

d) MOOC Discussions

Both instructor and learners noted the limitations of MOOC discussion forums. All participants in some way discussed the need for more effective designs for discussions.

e) Inclusion and Diversity

The need to design a more inclusive or diverse course was also reflected in several learner interview comments. The course was viewed as primarily focused on the Western perception and practices of happiness.

B. Learner Perceptions of Attitudinal Learning Gains

1) Descriptive statistics

Table 1.
Means, standard deviation and correlation coefficients (n = 792)

			Pearson correlation coefficient			
Variables	M	SD	1	2	3	4
1. Affective Learning	5.10	.82	1			
2. Behavioral Learning	5.27	.84	.543**	1		
3. Cognitive Learning	5.64	.67	.491**	.617**	1	
4. Course Satisfaction	5.19	.70	.507**	.678**	.712**	1

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

Table 2.
Enrollment purpose and most impactful learning activity

Variable		n	%
Enrollment Purpose	Simply interested in the course topic "happiness"	539	68.1
	Improve my existing viewpoint about "happiness"	162	20.5
	Earn a formal certification	53	6.7
	Learn about MOOCs in general	38	4.8
Most Impactful Learning Activity	Video lecture	426	53.8
	Reflection Exercises	162	20.5
	Reading material	143	18.1
	Knowledge test (quizzes, midterm, final)	61	7.7

Table 1 shows the descriptive statistics of learners' perceived attitudinal learning gains, and Table 2 shows learners' enrollment purpose and perceptions of the most impactful learning activity. The survey results supported the qualitative findings from the interviews. As for enrollment purpose, 68% of the participants responded that they took the MOOC because they were simply interested in the course topic 'happiness'. As for the most impactful learning activity, 54% of survey respondents perceived video lectures as most powerful. The course readings and reflection exercises were also identified as impactful with 18.1 and 20.5% of respondents ranking them as most impactful, respectively.

2) Cognitive, Affective and Behavioral Learning Gains

a) Cognitive learning

The SOH MOOC was specifically designed with attitudinal learning outcomes in mind and instructional strategies targeted all three components of attitude.

b) Affective learning

Affective learning outcomes were also indicated by learners who described increased happiness, self-awareness, and empathy. All but one of the interviewees said their happiness increased after the course.

c) Behavioral learning

There were some mixed descriptions about behavioral changes after taking the MOOC. While four interview participants indicated that their behavior did not change as a result of course, the rest stated that the practices helped them change their behaviors. One explained how, "The course influenced my decisions about how I spend my free time because I didn't want to fall behind in the work…. I feel it made me more compassionate toward those around me. I feel like I made good decisions more consistently while I was taking the class. The course helped stimulate me to take action; I saw a way to show gratitude."

3) Enrollment Purpose, Most Impactful Learning Activity, and Demographics

A one-way MANOVA was performed to investigate gender differences in learners' perceptions of attitudinal learning gains and course satisfaction. There was a statistically significant difference between males and females on the combined dependent variables, $F(4, 787) = 4.094$, $p < .001$; Wilks' Lambda = .98; partial eta squared = .27. An inspection of the mean scores indicated that females had significantly higher scores of behavioral learning ($M = 5.43$, $SD = .71$) than males ($M = 5.06$, $SD = .63$). The effective size for the gender group comparison was large (Cohen's $d = .56$).

MANOVA was conducted to examine the effect of learners' age on their perceptions of attitudinal learning gains. The results showed there was a significant difference between the age groups on the combined dependent variables, $F(4, 781) = 1.574$, $p < .05$; Wilks' Lambda = .946; partial eta squared = .01.

To determine the effect of the learners' perception of the most impactful learning activity on their perceptions of attitudinal learning gains and course satisfaction, a one-way MANOVA was conducted. The results revealed a main effect of the perception of the most impactful learning activity on attitudinal

learning gains, F (4, 714) = 2.905, p< .001; Wilks' Lambda = .97; partial eta squared = .32. Interestingly, the Hispanic group had higher scores in all of the dependent variables with a large effect size: affective learning [Hispanic (M = 5.34, SD = .82), Asian (M = 4.82, SD = .73); Cohen's d = .67], behavioral learning [Hispanic (M = 5.51, SD = .82), Asian (M = 5.02, SD = .79); Cohen's d = .61], cognitive learning [Hispanic (M = 5.79 SD = .82), Asian (M = 5.35, SD = .78); Cohen's d = .55], and course satisfaction [Hispanic (M = 5.35 SD = .78), Asian (M = 5.06, SD = .82); Cohen's d = .36].

A one-way MANOVA, which was performed to examine the relationship between learners' enrollment purpose and their attitudinal learning gains, revealed a significant effect, F (4, 787) = 3.742, p< .001; Wilks' Lambda = .98; partial eta squared = .32. In order to examine the effect of the most impactful learning activity on the dependent variables, a MANOVA was performed. The results indicated a significant effect, F (4, 785) = 6.014, p< .001; Wilks' Lambda = .91; partial eta squared = .32.

DISCUSSION AND CONCLUSION

A. Instructional Design Considerations

Statistics showed video lectures were perceived as the most impactful activity, perhaps not surprising given expectations for how instruction is typically delivered in MOOCs. Course reflection exercises targeted behavioral learners, as learners were asked to alter their behaviors, such as writing a letter of gratitude and reading it the person it addresses [6][10]. Finally, there was dissatisfaction with the discussion boards by both the learners and the instructor, who criticized its functionality.

B. Age, Gender, Ethnicity, and Other Diversity Issues

Results indicated learner demographics can impact how learners learn and point to the need for specific scaffolds and more personalized approaches to instruction. Finally, reason for enrollment did seem to impact cognitive learning outcomes; this could perhaps be due to differences in existing knowledge the students brought with them.

LIMITATIONS AND FUTURE RESEARCH

Several limitations exist, including the use of self-reported perceptions of learning, and a small sample size of the overall MOOC registrants. No pre-course survey was conducted so the study did not capture a direct measure of learning gains. Future research could benefit from increased sample size and the use of a pre – post approach to measuring learning. Finally, a follow up study measuring retention of attitudinal learning long term would be of benefit.

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