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## Hello, Are You There? Creating and Measuring Online Student Engagement

Kirsten Passyn

*The Citadel*, [kpassyn@citadel.edu](mailto:kpassyn@citadel.edu)

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# Hello, Are You There? Creating and Measuring Online Student Engagement

Kirsten Passyn, The Citadel, kpassyn@citadel.edu

**Abstract** - Engaging students in an online environment is frustrating for faculty and a concern of administration. Faculty and students report lower levels of satisfaction and lower engagement in online versus face to face learning. Dropout rates in fully online courses are often two times higher than face to face courses. This research attempted to engage online students by embedding a gamification-based scavenger hunt in an online course. Engagement was measured using a combination of quantitative and qualitative measurements. Although the scavenger hunt didn't significantly engage low performing students, it did motivate and deepen top-performing students' engagement. Interestingly, qualitative-based engagement measures proved more predictive of final grades than quantitative measurements, especially among high-performing students.

**Keywords** - Student Engagement, Online Learning, LMS Analytics, Gamification.

**Relevance to Marketing Educators, Researchers and/or Practitioners** - Engaging students in an online learning environment is challenging. A scavenger hunt embedded into course material, incorporating elements of gamification, enhanced hi performing but not lo performing students. Assessing engagement using both quantitative and qualitative measures helps better predict student performance, especially among high performing students.

## Introduction

In the Spring of 2020, traditional face-to-face courses were pushed online in efforts to help combat the spread of COVID-19. The result was deeply dissatisfied students, instructors struggling to keep students engaged (Lederman 2020), and unprecedented withdrawal rates (Craig 2020). Students that struggled before the crisis had significant DFW rates, but even students that excelled in a traditional classroom struggled when courses were moved online. Of course, multiple factors contributed to students' challenges, but many students simply found engaging in an online environment difficult. In fact, a survey of 1,008 college students across the country found students reported significant issues with motivation and engagement after moving online (Means and Neisler, 2020). Unsurprisingly, three-quarters of instructors surveyed following Spring 2020 said that "increasing student engagement" was an instructional priority for the fall (Lederman, 2020).

Challenges with engagement in an online environment have been noted and a focus of research long before the "suddenly online" experiment. A significant portion of this research has used learning management systems (LMS) analytics to assess engagement. Overall, and unsurprisingly, this research finds that students that engage more with course materials perform

better than students who access course materials less. However, this quantitative approach to engagement does little to distinguish the quality of engagement.

In this study, a bonus point scavenger hunt is embedded into course materials in an attempt to engage students by rewarding them for reading, watching, and listening to course materials. The impact of engagement on course performance is then assessed as in previous studies using LMS analytics. In addition, this study analyzes the number of responses to the embedded bonus points and the quality of these responses, allowing for both quantitative and qualitative assessment of engagement and an understanding of how quantity-based vs. quality-based engagement impacts student performance in an online course.

## **Literature Review**

### **Challenges with Online Student Engagement**

Due to its autonomous nature, online learning requires a high degree of initiation, organization, and self-regulation (Artino, 2008). Unfortunately, many students struggle with online learning, resulting in dropout rates between 25 and 40%. In contrast, dropout rates in face-to-face courses are between 10 and 20%. (Cohen, 2017). This suggests a greater challenge in achieving engagement with online than face-to-face learners. In fact, this higher dropout rate is attributed to low engagement and poor self-regulation among online learners (You, 2016). Student engagement is defined as the time and effort that students devote to their academic experiences (Ma et al., 2015).

### **Gamification**

One method intended to enhance engagement is gamification. Gamification is defined as the use of game play elements for non-game applications (Deterding et al., 2011). Previous research has suggested that, especially for unappealing activities that take a longer time, adding game-like activities to these tasks can motivate and engage people (Chrons and Sundell, 2011). Game mechanics such as challenges, points, and leaderboards can all enhance motivation and engagement (Muntean, 2011). In an attempt to motivate students to expend more time and effort in the course, especially chapter readings, this study embedded a bonus point scavenger hunt within the course materials. Students were then challenged to find the hidden bonus points, rewarded with points for reading, watching, and listening to course materials, and a weekly winners board was posted on the course home page reporting the percentage of points earned.

### **LMS Analytics as a Measure of Engagement**

Early studies on online engagement relied on self-report measures. However, LMS analytics improvements allowed researchers to use less intrusive, quantity-based measures, such as login frequency, to assess student engagement. In summary, this research found a significant relationship between grades and increased engagement, as recorded by the number of content views, frequency of logins, or time spent in the course (e.g. Johnson, 2005; Morris et al., 2005; You, 2016). The relationship between these analytics and performance even leads some researchers to conclude that institutions should start using these analytics to resolve academic problems and enhance student

performance (Johnson et al., 2014; Reyes, 2015). Hopefully, helping to reduce the high dropout rates in online learning.

However, some studies have questioned the efficacy of LMS data, suggesting that it is minimally relevant to engaged learning (Hadwin et al. 2007). Specifically, some researchers have started to question using quantity-based instead of a quality-based assessment of learning behaviors. In response, a study by Asarta and Schmidt (2013) made efforts to more carefully detail time-based measures, and in addition to conventional frequency measures, they also used pacing, anti-cramming, completeness, and consistency measures. This study found that overall frequency was less predictive of course success than pacing, anti-cramming, and consistency. Similarly, a study by You (2016) found that academic procrastination, as observed using LMS data, negatively predicted course grades. Combined, these studies suggest that time management, self-regulated learning, and the quality of online learning behaviors are more critical to success in online learning than just quantity based time spent measures.

However, even these studies rely on quantity-based, albeit more refined measures. Differences in students' reading rate, purchasing a physical copy of the text, ease of comprehension, and previous knowledge related to course content could all alter students' performance and engagement in materials in a way not measured by even refined LMS analytics. This study uses quantity-based measures but also quality based measures designed to assess material comprehension and learning, providing further insight into how engagement impacts students' performance in online courses.

## **Research Question and Hypotheses**

As found in previous research and highlighted by the sudden switch to remote learning following the outbreak of COVID-19, engagement is both essential and difficult to achieve in an online environment. One proposed method of increasing engagement among students is to use gamification. This study embedded a bonus point scavenger hunt within course materials to challenge students to find points, reward students with bonus points on quizzes, assignments, and tests, and posted a weekly winners board in hopes of encouraging better course engagement.

RQ1: Does incorporating a bonus point scavenger hunt into course materials engage online students?

Much of the research on student engagement in online courses has relied on LMS analytics to measure engagement. These quantity based engagement measures have been shown to significantly predict course performance. However, some research has suggested that quantity-based measures are limited and do not account for deeper differences in engagement. This research is designed to compare the predictiveness of quantity-based measures of engagement and quality-based measures of engagement to provide a more nuanced understanding of how engagement influences learning. Specifically, the following hypotheses are advanced:

H1: Course grades will improve with increased engagement as measured by both quantitative and qualitative measures.

H2: Qualitative measures of engagement will be more predictive of final grades than quantitative measures.

## **Methods**

### **Participants**

The data was collected at a public, four-year university on the East Coast of the United States. The university primarily offers face-to-face learning, and in fact, the core student body can only take online courses during the summer. However, the university also offers a degree completion program where online learning is regularly offered. This summer offering of Principles of Marketing included 20 students representing equal numbers of both the core student body and the degree completion students. The sample was heavily male (85%), and all participants were classified as business majors and either juniors or seniors.

The course consisted of eight weekly modules, with each week covering approximately two textbook chapters. A full course schedule with all due dates was provided to students along with the syllabus at the start of the semester. At the start of each week, the LMS home page was updated to display all required and optional weekly assignments. Introductory content videos (some sourced from the text, some created by the professor, and some externally sourced) with associated quizzes and chapter readings with associated quizzes were the primary course materials. Each week also included a graded discussion board, the format of the discussion boards varied from uploading student-created videos, to written discussion boards, to uploading external content. In addition, there were optional discussion boards to explore topics, prepare for exams, and Q & A discussion board. The course was divided into three units with exams occurring at the conclusion of each unit. Exams were the only synchronous assignments in this course, and two exam periods for each exam were determined based on a Doodle Poll.

### **Measures**

The LMS analytics used were total page views and final grades. Total viewing time was not used as it was brought to the attention of the instructor that a portion of the students had opted to purchase a hard copy of the text, and therefore, this data would have been inaccurate. However, as all reading was associated with a quiz, all students would have had to log in to complete the quizzes associated with the reading, so page views should be a reasonable quantity-based engagement measure.

In addition, the instructor embedded a bonus point scavenger hunt throughout the course. This scavenger hunt was introduced in the course introduction video, along with the first bonus point. Other points were embedded in the reading, in emails from the instructor, and in discussion boards. To earn the bonus points, students had to email the instructor. Some of the bonus points just required a specific subject line on the email; for example, the initial point only required

students to email the professor with the subject line "scavenger hunt." However, most points required students to provide insight into a situation, answer a question, or provide an example. All students that emailed regarding the bonus point earned credit. However, the instructor also assessed the quality of engagement by rating the students' emails: 1 poor, 2 fair, 3 good. A description of each scavenger hunt bonus point is available in Table 1.

**Table 1: Description of Scavenger Hunt Bonus Points**

Type	Quality	Points	Description
Video: Course Introduction	no	1	In the course welcome video, the instructor introduced the scavenger hunt bonus point concept.
Reading: Chapter 1	yes	1	Provide an example of a business that is successfully using social media to form relationships with customers.
Discussion Board: Consumer Persona	yes	1	Embedded in the instructor's sample consumer persona was a request to identify one demographic and one psychographic element contained in the persona.
Reading: Chapter 2	yes	1	Provide an example of one weakness and one threat currently facing the university.
Reading: Chapter 9	yes	1	Provide an example of a business that engages in benefit segmentation.
Reading: Chapter 9	yes	1	Provide examples of businesses that use differentiated, undifferentiated, and concentrated segmentation strategies.
Reading: Chapter 11	yes	1	Provide an example of a business that uses benefit segmentation
Reading: Chapter 11	yes	1	Discuss how you think COVID-19 will change packaging? Do you expect this to be a long-term or short-term change?
Announcement/Email: Exam 1	yes	5	In an email/announcement letting students know Exam 1 grades were posted, along with the test statistics, students were told they could explain why they got two questions wrong and why the correct answer was correct.
Announcement/Email: Exam 1	no	1	An exam insights key discussing why common wrong answers were incorrect and why the correct answer was better was emailed to students. It included a bonus point on the exam.
Reading: Chapter 13	yes	1	Provide an example of a product category that has elastic demand.
Discussion Board: Advertising	no	1	This was an optional discussion board where the instructor uploaded a favorite ad; students could upload their favorite ad for a bonus point.
Reading: Chapter 15	yes	1	Provide an example of a marketing channel intermediary and how this channel member adds value.
Reading: Chapter 16	yes	1	Discuss the long-term impact COVID-19 is likely to have direct marketing and non-store retailing
Announcement/Email: Presentation Review	yes	1	In an email/announcement letting students know presentation grades were posted, along with the assignment statistics, students were told they could email the instructor with one thing they should have done better in their presentation.
Reading: Chapter 17	yes	1	Discuss when you would use PR versus advertising and why.
Announcement/Exam 2	yes	1	In an email/announcement letting students know Exam 2 grades were posted, along with the test statistics, students were told they could explain why they got one question wrong and why the correct answer was correct.

## Results

### Bonus Points Scavenger Hunt Insights

The scavenger hunt bonus points' original intent was to encourage stronger student engagement by incorporating gamification mechanics such as challenges, points, and a leader board in course materials. To encourage more students to earn the bonus points, the instructor posted the percentage of students who had earned bonus points on the home page, thanked students via email for their initial participation, and individually emailed students that had not earned any bonus points in a given two week period encouraging them to participate in the bonus point scavenger hunt. In addition, all students were notified on the home page and via an announcement/email of the changes in overall grade statistics (average, high, and low) on exam 1, exam 2, and the current topic presentation grades after incorporating bonus points into these assignments. Despite these efforts, this system did little to encourage engagement among low-performing students (students with a final grade of C or lower). On average less than 20% of the class earned the bonus points. For the low performers, on average, only 7% earned bonus points.

To better understand what types of assignments are higher engagement, the bonus points can be categorized into chapter reading based bonus points, discussion board based bonus points, and announcement/email-based bonus points. The discussion board bonus points had the highest levels of engagement at 41% participation. This was followed by chapter reading based bonus points with an average of 16% engagement. The lowest participation occurred in the category with the most direct impact on final student grades (higher potential points and higher portion of the final grade) the announcements/emails regarding the exams and individual presentations, with an average of 14% engagement.

A comparison of earned bonus points was also made between low performers (final grade of C and below) and high performers (final grade of B and above). Unsurprisingly, on average high performers earned more bonus points (32%) than low performers (7%). Consistent with the overall findings, engagement for both groups was highest with discussion boards, followed by chapter readings, and finally announcements and emails. See table 2 for insights into the different types of bonus points and engagement levels.

**Table 2: Assessment of Engagement Based on Bonus Point Scavenger Hunt**

Type of Points	#	Points	Overall engagement	Hi-performers engagement	Lo-performers Engagement
All	16	21	19%	32%	7%
Discussion Board	2	2	41%	63%	25%
Chapter Reading	10	10	16%	28%	5%
Announcement/Email	4	9	14%	24%	3%

## Descriptive Statistics

An initial overview of the data was conducted by dividing the students into two groups based on final grade in the course, high performers (final grade of B and above) and low performers (final grade of C and below). In line with previous findings, the low performing students had significantly lower engagement as compared to the high performing students in terms of all measures (page views  $t=5.21$ ,  $p < .01$ ; total bonus points  $t=2.56$ ,  $p = .02$ ; quality of bonus points  $t=5.38$ ,  $p < .01$ ). Additionally, this research sought to understand differences among high performing students, comparing students with a final grade of A versus B. Interestingly, in terms of page views the average page views for the B students was directionally higher than the average page views for the A students, this difference was however not significant ( $t < 1$ , ns). Additionally, the total number of bonus points, although directionally higher for A students than B students, was also not significant (total bonus points  $t= 1.2$ ,  $p=.25$ ). However, the difference in the quality of the bonus points was significant ( $t=6.13$ ,  $p<.01$ ). In summary, in line with previous research, quantitative assessment of engagement can be used to distinguish between low performers and high performers in online courses. H1 is supported. However, to distinguish among the high performers, A and B students, only the quality based measure of engagement was significant. H2 is supported. See table 3 for detailed results.

**Table 3: Average Engagement Levels**

	LMS Page-Views	Total Bonus Points	Quality of Bonus Points
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
All Students	422 (203)	3.7 (3.98)	1.85 (2.70)
Hi-Performers	548 <sup>a</sup> (159)	5.33 <sup>b</sup> (4.29)	2.45 <sup>c</sup> (0.65)
A students	539 (160)	6.57(5.15)	2.93 <sup>d</sup> (0.18)
B students	560 (177)	3.6 (2.07)	1.8 <sup>d</sup> (2.16)
Lo-Performers	234 <sup>a</sup> (66)	1.25 <sup>b</sup> (1.66)	0.7 <sup>c</sup> (0.81)

Comparison of means with the same superscript, significant  $p < .05$

## Correlation Analysis

Similar to the above, correlation analysis revealed that the quality engagement measure was a better predictor of final grades than the quantity-based engagement measures. Both the LMS page view measure and the total bonus point measure were only moderately correlated with final grades (page views  $r(18)= .63$ ,  $p$ , total bonus points  $r(18)=.55$ ). In contrast, the quality based measure was highly correlated with final grades (  $r(18)= .80$ ). This finding that quality engagement over quantity engagement was especially relevant to distinguish between A and B students (page views  $r(10) = -.06$ ; total bonus points  $r(10) = .40$ ; quality of bonus points  $r(10) = .82$ ). Again these findings suggest that quantity based measurements are effective at assessing differences between low and high performers in an online course; however, quality engagement is needed to predict the difference among high performers, A and B students. Thus providing additional support for H1 and H2. See table 4 for full correlation analyses.

**Table 4: Correlation Analyses**

	1	2	3	4
1. Final Grade	1			
2. LMS, Page Views	.63	1		
3. Total Bonus Points	.55	.68	1	
4. Quality of Points	.80	.57	.63	1

## Discussion and Conclusion

The bonus point scavenger hunt's objective was to use gamification principles to encourage engagement among students. Unfortunately, given the poor response rates, especially among low-performing students, this does not appear to be an effective strategy. Students that were already engaged with the material earned points while low-performing students did not. The highest levels of engagement occurred in the discussion boards. This in combination with previous research on best practices in online learning that finds that peer interaction is both important and engaging for students (Means and Neisler, 2020) suggests that an impactful way to engage, even low performing students is by increasing the number of discussion boards and other peer interactive assignments. Similarly, the bonus point with the highest engagement level was the instructor's consumer persona's bonus point. This also suggests that students are looking for more personal interaction with peers and the instructor. In fact, over 65% of students surveyed after having the courses moved online due to COVID-19 cited a lack of interactivity and limited opportunities to collaborate with students and faculty as a reason for their diminished satisfaction with the remote component of the course. Engaging students with each other and with the instructor should help improve student engagement.

Highly engaged students voiced a strong liking for the scavenger hunt bonus points, not only because it helped them earn points but because it prompted students to find real-world examples ("I really struggled to find an example, but that helped cement the concept.") and encouraged personal communication with the course instructor (Wow, I hadn't thought of it that way, thanks for providing these little nuggets of insight throughout the course."). The instructor also noted that students that regularly found the bonus points increasingly engaged with the instructor throughout the course asking questions, sharing perspective, and looking for clarification as needed. So although the bonus points did not as hoped engage low performing students, it did appear to enhance the engagement and learning of high performing students.

Interestingly, the lowest levels of engagement were the announcement/emails. The author would have predicted these to have the highest engagement as students are typically concerned about test grades, the potential points were typically higher, and as emails were sent using the "send an individual message to each recipient" function in the LMS. Thus the email communication should have appeared individualized. However, it does appear that emails are largely ignored by students, even if they may contain critical information. Suggesting that instructors need to find better ways of reaching students regarding critical course information than

email. One possibility the author forwards is using video instead of text communication. Although few bonus points were included in videos, the two bonus points that were video-based had higher than average participation. For more information on when and what types of videos are most likely to encourage engagement, please refer to Guo, Kim, & Rubins (2014) research on this topic.

Previous research has suggested that course performance can be predicted based on quantitative-based LMS engagement analytics. This research confirmed these findings, finding high performing students to have significantly higher page views than low performing students. This research also collected a quality assessment of engagement, how accurate and insightful students' comments were in response to the bonus point questions. This quality-based measure was predictive of differences in final grades among high and low performers. In fact, this was the only measure highly correlated with final grades; the LMS based quantitative measure was only moderately correlated. However, this quality based measure was most insightful at distinguishing among the high performers. In fact, counter to expectations, the quantitative-based LMS engagement measure was directionally but not significantly higher for page views for the B students than the A students. In contrast, the quality of student engagement was significantly higher for the A students than the B students. In summary, this research suggests that both the quantity and the quality of engagement are predictive of final course grades. Quality of engagement is especially insightful when considering differences among high performers.

## **Limitations and Future Research**

The bonus points scavenger hunt was not effective at increasing engagement, especially among low performing students. However, this study incorporated only a couple game mechanics into the scavenger hunt. Most especially, in an effort to protect students' anonymity, the leader board was not cumulative and gave percentages instead of individual leaders. Future research should incorporate additional game mechanics such as including an avatar to incorporate a cumulative, rank-based leader board. Furthermore, virtual goods/gifting should be added to the scavenger hunt. For example, if students could earn extra time on exams, or a deadline extension pass, they may become more motivated and engaged. Simply earning additional points on quizzes, assignments, and tests did not appear to motivate students.

Given the small sample size and the fact that the course instructor made the quality evaluation, this research could benefit from replication with a larger, more diverse sample and assessment of quality by blind evaluators. A larger sample size could also allow for more rigorous statistical testing of the hypotheses. Future research could also embed bonus points into a larger variety of content. This research focused on three categories, chapter readings, announcements/emails, and discussion boards. Such research could provide added insight into what types of assignments enhance engagement, and this understanding could be used to help build better, more engaging courses moving forward.

In conclusion, this research provides some promise that including a bonus point scavenger hunt, especially if more game mechanics are included, could help better engage students with course material. High performing students seemed to find increased motivation, engagement, and

reward because of the bonus point scavenger hunt. Importantly, this study provides initial insights into the benefits of assessing not just quantity-based measures of engagement but also quality-based measures. This quality distinction is especially useful at distinguishing among high performers.

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