Using Google Analytics to Improve the Course Website of a Database Course

Brittney Romanowski and Abdullah Konak

Abstract

Online learning has grown steadily in the last decade, and the use of learning analytics has increased in parallel. As online education continues to grow, instructors need to find new ways to enhance student learning online and to understand students' interactions with their online learning environment. This paper presents an implementation of Google Analytics as a learning analytics tool on a database course website. The course website was created as an interactive e-book, and the objective of the study was to discover which features of the website were most effective in improving student learning. During a semester, Google Analytics was used to record student event data on the course website in order to understand how students interact with the website. The collected data were analyzed to discover patterns and trends in student interactions. Discovered patterns were then correlated with various attributes of the individual website pages such as the level of interactivity and page content type. Findings showed that the interactivity of a course page was the most important factor for increasing student engagement with the course content. In particular, in-page quizzes were found to be very effective in improving student engagement with the website. This preliminary study has shown how Google Analytics could be a valid tool to observe and improve student learning online.

Keywords

Learning Analytics, Google Analytics, Online Learning

Introduction

With increased development of information technology and the Internet, online learning has grown (Allen & Seaman, 2014).

traditional courses as well[5]. In particular, some instructors are using online textbooks or online homework. In addition, other instructors are using the pedagogical method of a flipped classroom where students watch and review lectures before class time so that instructors can focus on exercises during the class time. With the emergence of online courses and course materials as well as the increased use of online content in traditional courses, instructors do not

After each weekly meeting of the IST 210 sections, the data recorded by Google Analytics were downloaded and exported into an Excel file. Additionally, the data were generated into a custom report in order to analyze dimensions and metrics that are relevant to the study's objective of determining whether Google Analytics can be customized to aid in the evaluation of the learning system or course website.

The individual dimensions chosen were page, date, operating system, session duration, and hour. The individual metrics that were chosen for the report were pageviews, bounce rates, and average time on page, as previously discussed. The main metrics used for analysis were pageviews and average time on page. These metrics were used to compare each web page and the content on the page to the projected amount of student interaction. A total of 2297 data points were collected between the time period of January 10, 2016 through March 4, 2016. This analysis only included the pages that contained course materials covered during the specific time period.

In order to analyze the students' relationship with the IST 210 course website, each of the website's pages were categorized based on the level of interactive elements that the page included. The purpose of categorizing the website's pages was to determine the relationships between the collected data (dimensions) and the interaction attributes of the website's pages. Thereby, the attributes of pages that engaged students the most could be determined.

In order to categorize the pages, each page was carefully observed for a number of characteristics. The pages were coded based on five attribute categories: quizzes, exercises, code examples, images, or videos. If a page contained the content, it would receive a (1) in that

2016

having an interactive quiz in the page has a positive effect on students' engagement with the page.

Table 2. The Effect of Quizzes on Student Engagement

Characteristics/Involvement		Mean	Std. Deviation	*t* value	*p* value
Average Time on Page	Without Quiz	136.16 Seconds	298.849	-3.238	0.001
	With Quiz	179.99 Seconds	343.137		
Pageviews	Without Quiz	1.36 Views	0.876	-2.411	0.016
	With Quiz	1.45 Views	0.897		

In addition to quizzes, some pages include exercises that students are expected to complete as they read through the text. Unlike quizzes, correct answers to exercises are not provided to students. Table 3 does not show any significant relationship between the average time on page and the presence of an exercise on that page (t=0.610, p=0.542). In addition, the relationship between pageviews and the presence of an exercise on that page was not significant (t=-1.704, p=0.089).

Table 3. The Effect of Exercises on Student Engagement

Characteristics/Involvement		Mean	Std. Deviation	*t* value	*p* value
Average Time on Page	Without Exercises	157.68 Seconds	318.479	0.610	0.542
	With Exercises	162.91 Seconds	332.783		
Pageviews	Without Exercises	1.42 Views	0.882	-1.704	0.089
	With Exercises	1.39 Views	0.900		

In Table 4, the relationship between the presence of images and student engagement are analyzed. There is a significant relationship between the average time on page and the presence of images (t=-2.377, p=0.018). For pageviews, however, no significant relationship was observed (t=-0.399, p=0.690). It should be noted that illustrative images are frequently used in the course website to explain many database concepts. The results in Table 4 may show that students took time to study these illustrative images.

Table 4. The Effect of Images on Student Engagement

Discussions and Implications of the Findings

In this preliminary study, it has been determined that Google Analytics is an effective alternative as a learning analytics tool. Google Analytics can gather enough student event data that could then in turn be analyzed to understand the students' behavior interacting with the course website. This resulted in an understanding of how to better tailor the course website to the students' learning. However, Google Analytics could not capture data pieces that can be directly associated with individual students. This is a drawback of the version of Google Analytics used in the study. When using an institutionalized version of WordPress, instructors do not have all the features of a non-institutionalized user. This version did not allow for code and other features to be changed to accommodate the objective of tracking individual users. A non-institutionalized user would have the ability to change code within WordPress and could implement an individual tracking ID for each user. This could then allow for the individual analysis of each user's behavior with the site.

The information presented from this study's analysis resulted in some distinct findings about students' behavior with the course website. The first finding from this study was what interactive feature students find the most beneficial when they review course material. Students expressed that the in-page quizzes were the main feature within the course website they used for reviewing. These quizzes offer instant feedback to the students in order for them to gauge their understanding of the material. The data collected through Google Analytics confirmed this claim because students tend to spend more time on a page if the page includes a 2-2(a)4(t22(ur)3a)-6()(onf)

References

1 Allen, E., & Seaman, J. Grade change: Tracking online education in the United States, 2013. Retrieved September 24, 2015, from http://onlinelearningconsortium.org/survey_report/2013-survey-online-learning-report/

2 Baker, R., & Siemens, G. Educational data mining and learning analytics. In Sawyer, K. (Ed.) Cambridge Handbook of the Learning Sciences: 2nd Edition, 2014, pp. 253-274.

3 The First International Conference on Learning Analytics and Knowledge, Retrieved September 24, 19, 2016, from https://tekri.athabascau.ca/analytics/

4 Dimensions &