

# Digital Learning Impact Factors: Student Satisfaction and Performance in Online Courses

Lou Chitkushev, Irena Vodenska, and Tanya Zlateva

**Abstract**—As digital learning continues to spread and gain in popularity and acceptance, it is essential for both the providers and the users to understand the factors that impact student satisfaction and performance in online courses. In this study student evaluation parameters from 93 online graduate courses with total of 4920 student enrolments were analyzed for their interdependences as well as their correlation with student performance measured through final grade distributions. The results show that student course satisfaction is strongly correlated with students' instructor satisfaction, while the students' course satisfaction is moderately correlated with student satisfaction with facilitators. There is a positive correlation between students' final grade distribution and their overall satisfaction with the course as well as between the students' final grade distribution and the satisfaction with the instructor. On the other hand, the correlation of the students' satisfaction with the facilitators did not have statistically significant correlation with the final grade distribution. The results point to the critical importance of the instructor of record in online courses and to the significant impact of the students' satisfaction with instructor's performance. Moreover, the same factors have statistically significant impact on the performance of students in the class, together with the student perception of the overall academic quality of the course. At the same time, the data show that facilitators have a significantly lower impact than the instructors to the students' overall educational experience in online courses.

**Index Terms**—Digital learning, online courses, course evaluations, instructor, evaluations, facilitators.

## I. INTRODUCTION

Digital learning is perceived as a major disruptive educational technology with capability to fundamentally change the way higher education is delivered. Online courses, as prevailing implementation of digital learning concepts and practices, are rapidly becoming the delivery mode of choice for number of educational programs, especially at the graduate level and in the area of professional education. During the last decade the online enrollments have grown more rapidly than the overall college population, while the number of students taking at least one online course in the US has been an order of magnitude higher than the increase in the higher education population [1].

As the digital learning continues to spread and gain in popularity and acceptance, it is essential that we understand the factors that impact student satisfaction and performance and the overall educational experience in online courses. Digital learning is an inherently distributed and complex

cognitive process and any in-depth analysis needs draw from theories of different disciplines. Especially relevant is earlier work on transactional distance in distance learning [2], cognitive studies of multimedia learning [3], communication patterns in organizations [4] and distributed cognition [5]. While these multi-disciplinary theories provide an overall framework for understanding digital learning a number of recent studies have analyzed the learning outcomes in online courses and the way they are affected by course design or delivery specifics [6]-[8]. In previous studies of Boston University online programs [9], [10] a parametric model for online courses was introduced that included class size, course content, assessments, and student satisfaction. The model was used to analyze the online learning experience based on data from 51 online courses delivered in the graduate online program at Boston University's Metropolitan College. Another study by the same group provided in-depth analyses of online course organization and student perception as reflected in the student course evaluations. The result of that study showed that course organization and instructor presentation of material are significant indicators of overall student satisfaction [11].

This paper is built on the work previously done at Boston University, by analyzing a different set of online courses and by focusing on course evaluation data and specifically the overall course and instructor satisfaction metrics. The correlations of satisfaction rates have been explored, and their dependencies on other course evaluation parameters, as well as on student performance in the classes.

All the courses analyzed in this study were part of the same graduate online program, and included multiple offerings of the courses over the 6 year period between 2007 and 2013. The online delivery system used at Boston University Metropolitan College is based on asynchronous mode with optional live classrooms - webinars and video-conferencing for discussions sessions. The courses are offered in seven week format and are implemented in Blackboard. They have media-rich online content and include videos, discussion boards, animations, quizzes, virtual laboratories and proctored online exams. The courses are developed and delivered almost exclusively by full-time faculty, and a facilitator is assigned to every 15 students.

The rest of this paper is organized as follows: Section II describes the data and methodology used, Section III discusses the results, and the Section V offers a conclusion, which summarizes the main finding of this study.

## II. DATA AND METHODOLOGY

The data was collected from 93 online class sections delivered over 18 semesters from Summer 2007 to Summer

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2013. There were 20 different courses that on average were delivered between 4 and 5 times in the observed period with total number of 4,920 students. For each course the following parameters were recorded: number of students, student response rate, number of facilitators, final grade distribution, overall course satisfaction, overall instructor satisfaction and average satisfaction with facilitators.

This paper discusses the major factors for student satisfaction, such as instructor overall rating, facilitator rating, and overall course satisfaction. It builds on our previous findings [9], [10] that pointed to a negative correlation of class size and student satisfaction. The data used for this study is derived from student responses to an online rating survey of 30 questions that are rated on a five-level Likert scale with 1 (negative/strongly disagree) and 5 (positive/strongly agree). The questions are divided in four groups that assess student opinions of the course, instructor, facilitators, and technical support. The response rate for the online student survey, for the 93 courses analyzed here, ranged from 16% to 100% with a mean of 43% and standard deviation 15%. To better understand the underlying relationships the following relationships were analyzed: 1) overall student satisfaction with facilitators and overall satisfaction with instructors, 2) overall satisfaction with instructor and overall course satisfaction, 3) satisfaction with facilitators and overall course satisfaction, 4) overall satisfaction with course and final grade distribution, 5) overall satisfaction with facilitators and final grade distribution, and 6) overall satisfaction with instructor and final grade distribution.

The relationship between *Overall satisfaction with instructor* and *Overall satisfaction with course* was analyzed for 95% confidence level, and it was found that *Overall satisfaction with course* is statistically significantly related to *Overall satisfaction with instructor* with a p-value of  $1.54035E-34 < 0.05$ , and with R-square of 0.8062 as shown in Fig. 1.

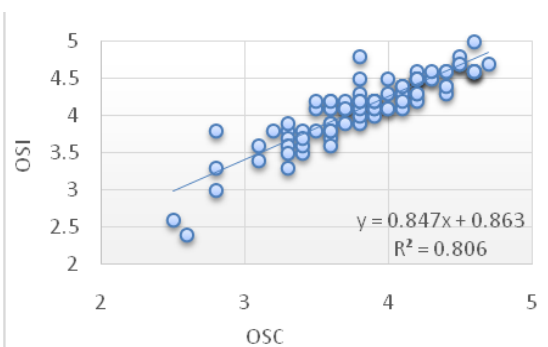


Fig. 1. Overall satisfaction with instructor vs. overall satisfaction with course for summer 2007 to summer 2013 (Statistically significant with  $p=1.54035E-34 < 0.05$  at 95% confidence level).

In addition, Fig. 2 shows that *Overall satisfaction with instructor* is also positively related to the *Overall satisfaction with facilitator* with p-value of  $3.37016E-11$  and R-square of 0.3813.

Similarly, *Overall satisfaction with course* is also positively related with the *Overall satisfaction with facilitators* with p-value= $1.19404E-13$  and R-squared of 0.4518 as illustrated in Fig. 3.

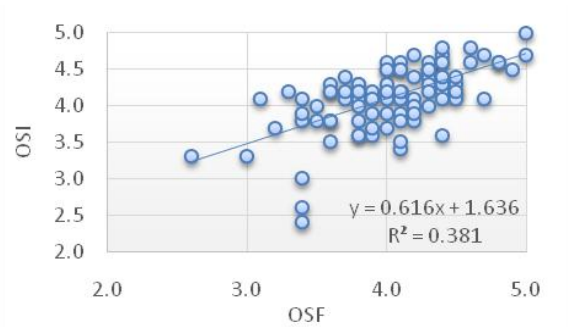


Fig. 2. Overall satisfaction with instructor vs. Overall satisfaction with facilitators for summer 2007 to summer 2013 (Statistically significant with  $p=3.37016E-11 < 0.05$  at 95% confidence level).

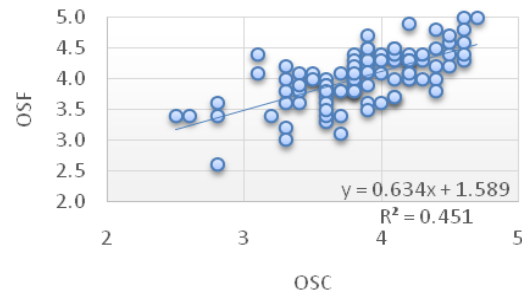


Fig. 3. Overall satisfaction with facilitators vs. Overall satisfaction with course for summer 2007 to summer 2013 (Statistically significant for  $p=1.19404E-13 < 0.05$  at 95% confidence level).

In Fig. 4 we show that *Overall satisfaction with course* exhibits weaker correlation with *Final grade distribution*, even though the relationship is still statistically significant at 95% confidence level with coefficient of determination, R-squared of 0.183 and p-value of 0.0010068.

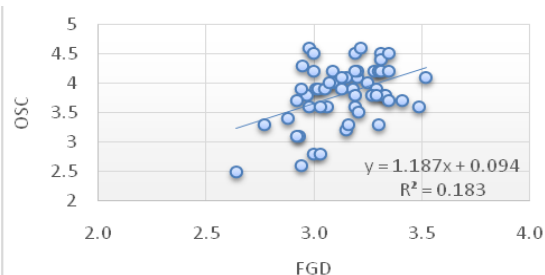


Fig. 4. Overall satisfaction with course vs. Final grade distribution for summer 2007 to summer 2013 (Statistically significant with  $p=0.0010068 < 0.05$  at 95% confidence level).

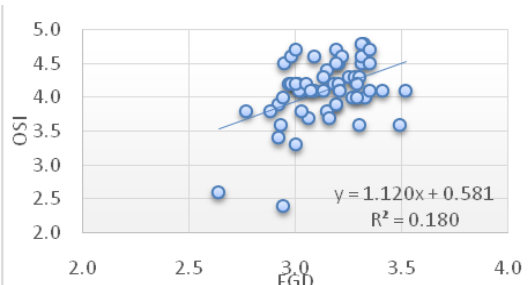


Fig. 5. Overall satisfaction with instructor vs. Final grade distribution for summer 2007 to summer 2013 (Statistically significant with  $p=0.001097368 < 0.05$  at 95% confidence level).

*Overall satisfaction with instructor* is also weakly positively correlated with *Final grade distribution*, while the relationship is still statistically significant at 5% significance level, with p-value of 0.001097368 and R-squared of 0.1806 as illustrated in Fig. 5.

While *Overall satisfaction with course* and *Overall*

satisfaction with instructor show positive statistically significant correlations with *Final grade distribution*, *Overall satisfaction with facilitators* exhibits almost no correlation or close to zero correlation with *Final grade distribution*, and the relationship is not statistically significant at 5% significance level with  $p=0.094537894>0.05$  and  $R$ -squared of 0.0509 as shown in Fig. 6.

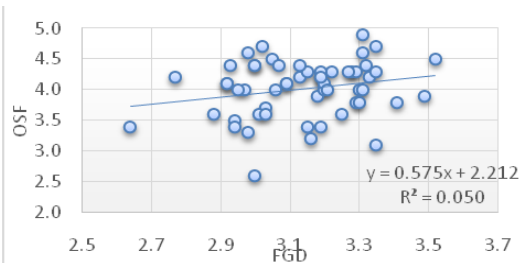


Fig. 6. Overall satisfaction with facilitator vs. Final grade distribution for summer 2007 to summer 2013 (Not statistically significant with  $p=0.094537894>0.05$  at 95% confidence level).

### III. RESULTS AND DISCUSSION

The results of presented here analysis point to several correlations between the observed parameters. First, the *Overall satisfaction with instructor* (OSI) was correlated with the *Overall satisfaction with the course* (OSC), which was not surprising per se, as shown on Fig. 1. However, the degree of correlation was surprisingly strong, suggesting that it's statistically not probable to have students satisfied with a course if they are not satisfied with the instructor. And, vice versa, if the students are satisfied with the instructor it is very likely that they are satisfied with the course. The satisfaction rate with instructor is an important parameter for overall student satisfaction with a course.

Second finding points to the dependency between the *Satisfaction with instructor* and the *Satisfaction with facilitators*. As shown on Fig. 2 if the students were satisfied with their facilitators, they were more likely to be satisfied with the instructor. When the satisfaction rate with the facilitators was low it was more probable to have lower satisfaction rate with the instructors, as well. This is a significant finding, since it points to the relationship between the facilitators' evaluations and instructors evaluations. Instructors are supervising the facilitators in the studied model of online classes, so they have a possibility to impact students' satisfaction rates by encouraging excellence and positive selection among the facilitators.

Third conclusion relates the overall satisfaction with the course and the satisfaction with the facilitators. This is an expected finding since it points to the fairly strong dependency of course satisfaction to the facilitator performance as perceived by the students. From Fig. 3, it can be seen that it is more likely that the students will be satisfied with the course if they are satisfied with their facilitators. This result further stresses the importance of facilitators' evaluation management and selection.

The analysis of the correlation of each of the above parameters with the final grade distributions of the class points to the factors that can affect student academic performance. It was found that the overall course satisfaction rate has a weak positive correlation with the grade

distribution (Fig. 4.). In other words, if the students are satisfied with a course it is statistically more likely that their final grades will be higher. Also, as expected, similar correlation was noticed between the instructor satisfaction rates and the final grade distribution, as shown on Fig. 5.

Finally, the correlation between the final grade distribution and the satisfaction rate with facilitators was positive, but statistically much weaker, as seen on Fig. 6. That means that the final grade distribution of a class was not significantly correlated with the students' satisfaction with facilitators.

### IV. CONCLUSION

Analysis of digital learning impact factors was done with the intention to better understand the features that affect student satisfaction and performance in online courses. Specifically, this study was focused on the analysis of course evaluation parameter and their interdependences as well as their correlation with student performance in the class.

The initial results on interdependences of online course satisfaction parameters show that student course satisfaction is strongly correlated with the student instructor satisfaction, and is correlated with student satisfaction with facilitators. This result points out to the critical importance of the instructor of record in online courses and students' satisfaction with instructor's performance. This is of particular importance in online courses with noticeable instructor-student interaction, such as synchronous components or discussion sessions. Moreover, given the fact that instructors of record are very often decision maker in selection of facilitators, their impact to student satisfaction becomes even more prominent.

The analysis of the dependencies of online course student satisfaction parameters on the student class performance, measured through the student final grade distribution found that there is a positive correlation between students' final grade distribution and their overall satisfaction with the course and with the instructor. This important result points out to the essential impact of the instructor of record as well as the student perception of the overall academic quality of the course to the performance of students in the class. The overall student performance was decreased when students were less satisfied with the instructor or the course. Instructor and course quality are essential impact factors for student performance in online classes.

On the other hand, the correlation of the students' satisfaction with the facilitators did not have statistically significant correlation with the final grade distribution. This result points out to the secondary role of facilitators in the online classes, and the critical impact of instructor of record to the students' educational experience.

Future studies of satisfaction parameters should analyze the trends within the multiple running of the same course, as well as on the correlation of satisfaction parameters with other online class metrics, such as the course material size and students drop rates and their impact on student satisfaction and performance.

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