



# Students' Utilization of Flexibility of Time and Place in a Fully Online Academic Course

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## Abstract

*The emergence and the rapid growth of online courses in higher education offer flexible learning opportunities to the twenty-first-century learners. Flexible learning addresses differences between students by providing them varying degrees of choices regarding what, where, when, why, and how to learn. Studies indicated that flexibility constitutes a key factor in students' enrolment to online courses. The purpose of this study was to gain insights into how students utilize flexibility of time and place in a fully online academic course. The research questions were: (1) How do students utilize flexibility of time and place in a fully online academic course? (2) What types of students can be identified based on their learning time and place? The study examined 195 students, who participated in a fully online academic course in Humanities. The course consisted of diverse learning resources, including: video lectures, lectures summaries, supplementary materials, discussion forums, assignments and a final exam. The study was conducted using a data mining methodology. A set of variables were computed per student, describing his activity in the course in regard to time and place of study. The variables were analyzed using statistics and a cluster analysis. Overall, the findings revealed that flexibility of time and place was utilized in different ways. Three types of students were identified, distinguished mostly by their activity over the course quarters. The largest group of students spanned their activity throughout the semester whereas the other groups demonstrated intensified activity in specific quarters. All three groups spanned their activity over all the days of the week, with different preferences for days of more intense activity. Most students learned during noon and evening hours. In addition, it was found that most of the students' activity took place out of campus, which indicates that flexibility of place was significantly used. In line with the literature, this provides further evidence regarding the ability of a fully online course, which incorporates flexibility components, to serve diverse students' needs.*

## 1. Introduction

Rapid growth has been exhibited recently in online academic courses offered by higher education institutions. Decision makers at academic institutions consider online learning to be a critical long-term strategy [1][11]. Online courses offer flexible learning opportunities to the twenty-first-century learners [6]. Flexible learning is based on the recognition of differences between students, which are addressed by providing varying degrees of choices to learners regarding what, where, when, why, and how to learn [2] [3] [9]. Studies indicated that flexibility is perceived as beneficial to online instruction [7] [11] and constitutes a key factor in students' enrolment to online courses [10]. The purpose of this study was to gain insights into how students utilize flexibility of time and place in a fully online academic course and to identify types of students based on their learning time and place.

## 2. Background

A significant element of flexible learning is the provision of choice to learners [2]. Instead of key decisions about learning dimensions being made by the instructor or the institution ahead, the learner has a range of options from which to choose with respect to these dimensions [3]. Thus, flexible learning relates to individualization in the teaching and learning process [2].

There exist diverse definitions of flexible learning [2] which refer to different dimensions of flexibility that are grouped into categories. [4] for example referred to five categories of flexibility: time, content, entry requirements, instructional approach and resources, and delivery and logistics. [3] referred to four categories: technology, pedagogy, implementation strategy, and institutional framework. [5] distinguished between two types of flexibility: planning-type, which the instructor can designate before the course begins, and interpersonal type, which relates to the dynamics of the course as it is experienced by the learners. [2] presented seven categories of flexibility: time, space, methods, learning styles, content, organization and infrastructure, and requirements.

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This paper focuses on flexibility of time and place. Flexibility of time relates to aspects such as: time of interacting with the course, teaching time, duration of learning, pace of learning [2][5]. Flexibility of place refers to where the learning occurs, i.e. online vs. face-to-face, in regard to the entire course or to individual classes [9]. The new information and communication technologies enable to provide greater flexibility in learning time and place. Specifically, online courses allow access to course materials from anywhere at any time, which is not possible in a face-to-face environment [8]. Flexibility of time and place were reported as beneficial to students. [10] found that students appreciated online courses for allowing them to use their learning time more efficiently and to reduce the number of times they needed to travel to campus. The study reported in this paper aims to gain more insights into how students utilize the flexibility of time and place which is provided in an online course.

### 3. The Study

#### 3.1 Research Questions

1. How do students utilize flexibility of time and place in a fully online academic course?
2. What types of students can be identified based on their learning time and place?

#### 3.1 The Course

The study examined 195 undergraduate students, who participated in a fully online academic course in Humanities at Tel Aviv University in the academic year 2014/2015. The course lasted 13 weeks and was delivered via the university LMS. The course consisted of fourteen learning units which included: video lectures, lectures summaries, supplementary materials, discussion forums and assignments. The students were required to submit the assignments online and to pass a final exam on campus. Flexibility of time was provided by making all the learning resources accessible to the students from the beginning of the course. Thus, no limitations were set regarding learning times (weeks, days, hours) or learning pace, except for the assignments deadlines and the exam date. No limitation was set in regard to the learning place, except for the final exam location.

#### 3.2 Method

The study was conducted using educational data mining methodology. The data mining was applied on a data set, with over 86,000 records, which documented the students' activity during the course. A set of variables were computed per student, describing his activity in the course in regard to learning time and place, as follows: *Percent of actions in each quarter of the semester and after its end*, *Percent of activity on each day of the week (Sundays, Mondays etc.)*, *Percent of actions on each part of the day (6:00-12:00, 12:00-18:00, 18:00-24:00, 24:00-06:00)*, *Percent of actions in and out of campus*. The percent of actions was calculated as the number of student's actions in the course website during the relevant time period, divided by the total number of student's actions in the course website. The variables were analyzed using descriptive statistics and a K-Means cluster analysis.

### 4. Findings

#### 4.1 Students' utilization of flexibility of time and place

Figure 1 displays the students' entries to the course website over the semester; each row represents a student and each column represents a day in the course. The results indicate that there were extensive entries to the course website over the semester. Most of the students spanned their activity over the semester, ending close to the final exam. The average activity of a student over the semester quarters distributed quite similarly, as follows: q1: M=21%, SD=20%; q2: M=29%, SD=17%; q3: M=15%, SD=11%; q4: M=30%, SD=17%. In addition, some students were active after the end of the semester, until the second term exam. Notably, intensive activity occurred close to assignments submission deadlines, which can be seen by the darker areas in the graph.

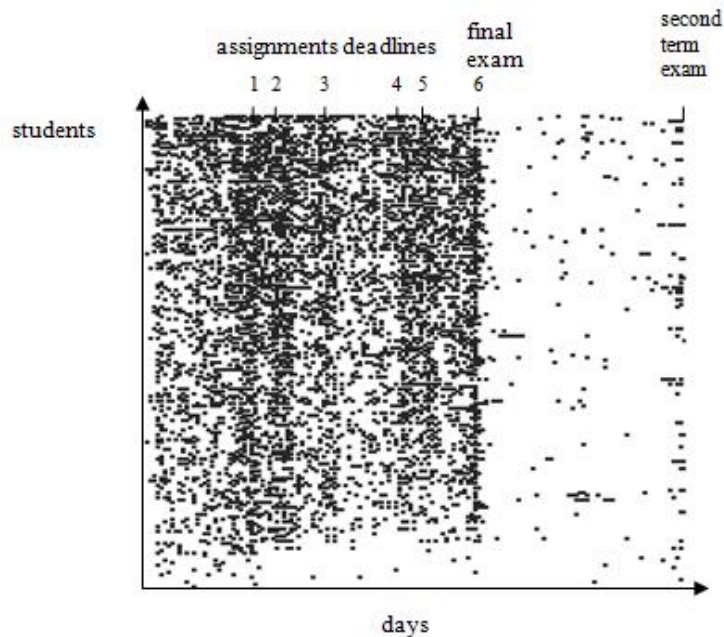


Fig 1. Students' entries to the course website over the semester

The average activity of a student on each day of the week distributed quite evenly, ranging from 12% to 16%. However, notable differences were found in regard to the average activity of a student at different parts of the day; noon and evening hours were more active than mornings and nights ( $M=40\%$ ,  $SD=17\%$ ;  $M=40\%$ ,  $SD=18\%$ ;  $M=16\%$ ,  $SD=15\%$ ;  $M=4\%$ ,  $SD=7\%$ , respectively). Regarding the learning place, on average, a student was active mostly out of campus ( $M=88\%$ ,  $SD=15\%$ ).

#### 4.2. Types of students by learning time and place

A cluster analysis was applied in order to identify types of students according to their learning time and place. The analysis revealed a model with three clusters. Significant differences were found between the clusters regarding most variables. Table 1 presents the clusters, the average value of each variable in each cluster and the F values of ANOVA tests. Figure 2 demonstrates the differences between the clusters in regard to the time variables.

Notably, the clusters were distinguished mostly by the portion of activity in each quarter of the semester. The first cluster is the largest one, with 76% of the students. They were characterized by spanning their activity over the semester, with a slight increase towards the fourth quarter. In addition, they spanned their activity over the days of the week, with a slightly higher activity on Fridays. They performed most of their activity during noon and evening hours, mainly out of campus.

The second cluster contains 14% of the students. These students were characterized by performing almost half of their activity, on average, during the first quarter. They also spanned their activity over the days of the week, with a slightly higher activity on Wednesdays and Thursdays, and a slightly lower activity on weekends. Their learning hours were quite similar to those of the students in the first cluster. Around 25% of their activity took place on campus, the highest among all clusters.

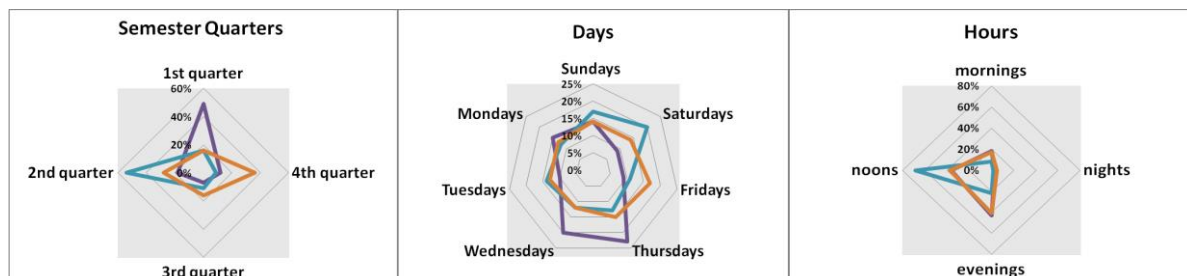
The third cluster contains 9% of the students, who were characterized by performing a significant part of their activity, 54% on average, in the second quarter of the semester. They, as well, were active all over the week, with a slightly higher activity on Saturdays. Notably, they were active mostly at noon, out of campus.



Table 1. The clusters found in the cluster analysis

| Variable   |               | Cluster 1<br>N=149 (76%) | Cluster 2<br>N=28 (14%) | Cluster 3<br>N=18 (9%) | F(2,192) |
|------------|---------------|--------------------------|-------------------------|------------------------|----------|
| % actions  | 1st quarter   | 16%                      | 49%                     | 16%                    | 52.24*** |
|            | 2nd quarter   | 28%                      | 18%                     | 54%                    | 38.20*** |
|            | 3rd quarter   | 16%                      | 7%                      | 11%                    | 10.53*** |
|            | 4th quarter   | 36%                      | 12%                     | 9%                     | 66.17*** |
| % activity | Sundays       | 14%                      | 14%                     | 17%                    | 0.68     |
|            | Mondays       | 13%                      | 15%                     | 12%                    | 0.60     |
|            | Tuesdays      | 13%                      | 10%                     | 14%                    | 2.82     |
|            | Wednesdays    | 12%                      | 20%                     | 12%                    | 5.54**   |
|            | Thursdays     | 15%                      | 23%                     | 13%                    | 5.96**   |
|            | Fridays       | 17%                      | 9%                      | 11%                    | 12.46*** |
|            | Saturdays     | 14%                      | 9%                      | 20%                    | 4.90**   |
| % actions  | mornings      | 17%                      | 18%                     | 8%                     | 3.29*    |
|            | noons         | 37%                      | 36%                     | 68%                    | 36.52*** |
|            | evening       | 41%                      | 43%                     | 22%                    | 11.98*** |
|            | nights        | 5%                       | 3%                      | 2%                     | 1.49     |
| % actions  | out of campus | 90%                      | 74%                     | 93%                    | 17.47*** |
|            | in campus     | 10%                      | 26%                     | 7%                     | 17.82*** |

\*p<0.5, \*\*p<0.01, \*\*\*p < 0.001



Cluster 1 Cluster 2 Cluster 3

Fig 2. The clusters according to time variables



## 5. Discussion

This study examined how students utilize time and place flexibility in a fully online academic course. Overall, the findings revealed that the students utilized the flexibility of time and place in diverse ways. Regarding flexibility of time, though the course contents were accessible to the students from the beginning of the course, the vast majority of the students (cluster 1) chose to span their activity over the semester. However, some students (clusters 2 and 3) demonstrated intensified activity during the first two quarters. These findings may imply that the students chose their preferred times and pace for studying. In addition, it is notable that the students spanned their learning activity over the days of the week, which may imply that they divided their workload, with preferences of specific days for more intense activity. This is in contrast to traditional face-to-face courses, which dictate specific days for learning. Most of the students were active at noon and evening hours, with some differences between the clusters. Finally, most of their activity took place out of campus, which indicates that flexibility of place was significantly used.

In conclusion, the findings indicate that the students utilized the flexibility of time and place offered by the online course, by choosing their preferred weeks, days, hours and place of study. In line with the literature [2][3][9], this provides further evidence regarding the ability of a fully online course to serve diverse students' needs in regard to learning time and place. This study is preliminary to a larger-scale study, which aims to examine how students utilize diverse flexibility aspects (e.g. time, place, learning resources usage, learning strategy) in fully online academic courses of varied disciplines and structures.

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