

COMPARISON BETWEEN TWO E-CLASSES FOR ELECTIVE COURSES IN SECONDARY AND TERTIARY EDUCATION

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ABSTRACT

In this work, we will compare the usability and functionality of electronic classrooms in secondary and tertiary education. We will compare the traffic, the instructiveness, number of downloads and how friendly both electronic classes are. We compared the electronic classes composed for "Geology and Management of Natural Resources" an elective course in High School and the course "Didactics of Natural Sciences" a second-year elective course at the Department of Primary Education, University of Patras. While in the field of higher education, distance education and electronic classes are an imperative tools for everyday use, on the other hand in secondary education, it has not yet gained the corresponding impact. The elective course about Geology was a unique opportunity to apply the model of blended teaching and flipped classroom based on an electronic classroom in Secondary Education and compare the statistics and usability to a similar teaching procedure in tertiary education.

KEYWORDS: *E-Class, Distance Teaching, E-Learning, Blended Teaching, Flipped Classroom, Statistical Analysis, Elective Courses*

INTRODUCTION

In recent years the extensive use of computers and internet contributed to the production of a large number of distance e-learning courses (Bozkurtetal., 2015). Today, allAnd more people are looking for and enrolling in distance learning programs, given the benefits they offer (OptionTimeMonitoringOfCourses-AsynchronousTeaching, SpatialAndTimeFreedomStudies, AccessInUniversitiesInEntireTheWorld).

DistanceLearning(White, 1982; Byrne, 1989) it is an alternative way of learning from a distance, without the need for a physical presence in a classroom. In distance learning, online presentations remain posted for a long time and in accordance with Tiene(Tiene, 2000), studentsareoverwhelminglyin favorofasynchronouscommunicationwiththeteacher - instructor. Interestingly, Duffy, Gilbert, Kennedy, and Kwong (2002) are mentioning that students who have received a degree from distance learning have garnered a significantly higher average than those who received a degree with a physical presence in academic auditoriums.

Blended Learning

On the other hand, the research interest in blended learning also appears to be intense and lasting. The term blended learning refers to learning that combines face-to-face teaching with Internet distance learning, thus reducing the monitoring time in the auditoriums (Dziuban, Hartman και Moskal, 2004). Blended-learning scenarios are mixing face-to-face teaching with e-learning in such a way that one method supports the other (Derntl και Motsching-Pitrik, 2004; Ginns και Ellis, 2007). This hybrid teaching does not simply use traditional and distance activities, but an effective set of the most positive elements of both these approaches (Δημητριάδης, Λιώτσιος, Πομπορτσής 2007). On this dimension Dziuban, Hartman και Moskal (2004) argue that mixed learning should be viewed as a pedagogical approach that combines the ability to socialize under the conditions of a natural classroom with the learning activities that involve students and are offered in the online environment. According to Gray (2006), blended learning combines the proven traditional methods of learning with new technology, resulting in the creation of a collaborative and dynamic learning framework.

However, despite the attractiveness of the teaching method and the originality of the learning process, blended learning does not seem to be particularly attractive in many countries' education systems. According to a survey of Akkoyunlu and Soyulu (2008), it was found that the university students of Hacettepe University in Ankara Turkey prefer the traditional educational processes. Respectively in a survey of Τόκη, Σύψα, Α. Παγγέ και Τ. Παγγέ (2013), where the opinions of active educators and students of higher education were studied, two-thirds of the sample indicate that prefers face-to-face teaching and attending conferences/seminars with a physical presence. Finally, according to a survey of Σύψα, Λέκκα και Παγγέ (2013), for distance learning using new technologies in preschool education in Greece, they stated that, despite their familiarity with ICT, they prefer the face-to-face lifelong learning and are wary of distance learning

The Flipped Classroom Model

Perhaps this reticence has gradually imposed the flipped classroom model. The flipped classroom model attempts to reverse the traditional standard learning sequence. In a flipped classroom, pupils are attending during the previous day online lectures, participate in online discussions, or conduct collaborative research at home, while in their physical presence in the morning class they resolve exercises, problems or complete their research work under the guidance of a Professor – mentor.

Unlike the traditional teaching model that is strictly teacher-centered, the flipped classroom model attempts to support and encourage student-centered model (Abeysekera, Lakmal, and Dawson 2015). It achieves this by giving students more time to explore issues in greater depth and creates significant learning opportunities in their physical presence in the classroom (Ronchetti 2010). At the same time, educational technologies, such as online videos contribute to the dissemination of educational material, but also to the availability of the material at any time, especially if the duration of the video course has the Ideal value of eight to twelve minutes (Topp 2011). So we understand that in a flipped classroom, the interaction between a teacher with pupils can be more personal and less teacher-centered, while students are participating actively in acquiring knowledge and evaluating their learning progress (Abeysekera, Lakmal, and Dawson 2015), (Alvarez, 2011).

However, the flipped classroom method is not so widespread in Greek schools, except for some cases (Μακροδήμος, Παπαδάκης, & Κουτσούμπα 2017), (Gariou-Papalexiouet. al. 2017), while is completely absent from classrooms of upper secondary education. It also does not appear to have been applied to higher education. Thus, we tried to apply this method in an elective course in Greek upper Secondary Education (High School). What we have attempted to implement was the posting of material for the course of «Geology-Management Natural Resources» and continuously the implementation of hands-on activities and another type of tasks in school classroom the next day. Moreover, we applied the same model in Tertiary Education and specifically in the Department of Primary Education in the University of Patras. During the course "Didactics of the Natural sciences", we suspended digitally (through an E-class constructed for lesson purposes) worksheets a couple of days before the laboratory part of the course and then we asked the university students to implement the laboratory exercise. This was the methodology of flipped classroom adjusted and applied to a higher education course.

The E-Class of the Course "Geology-Management of Natural Resources" Quantitative and Statistical Survey

The platform of e-class hosted on the Panhellenic School Network offers excellent possibilities for the creation of integrated courses with several auxiliary functions (uploading of audiovisual training material, posting of announcements, calendar, a book of progress etc.). With a simple search on the website of the e-class for Western Greece, we notice that 96 different courses (relatively satisfactory number) are posted for secondary education, but a closer search reveals that these courses are simple titles with no content. However, there are also some remarkable courses especially in the field of computer science, automation and technology.

Within this framework, we created an integrated course divided into two teaching hours thematic each that corresponded to school morning teaching. The theoretical framework was enriched with audiovisual material and Power Point presentations by the matic section. The whole material can be searched in the link: <http://eclass.sch.gr/courses/EL294123/> It is worth noting that university students from the Geological Department of the University of Patras participated in these particular courses giving a more experiential character to teaching by presenting rocks (sedimentary, igneous and transformed), fossils, but also tools of geological excavations. The presence of students contributed even more towards blended learning, but also of the flipped classroom, as pupils had prior access to digital material and in retrospect they were able to even experientially to enrich or gain new knowledge. Typically, it is noteworthy to mention that the students during the course, had access to the theoretical framework of sedimentary rocks that "lay" fossils and then the next day they had the unique ability to touch with their own hand's sedimentary rocks and formed fossils.

On the statistics of the e-class of the course of Geology, from September 2017 to June 2018 we had a total of 445 visits from the enrolled students. It should be mentioned that the registered students were 27 in total, which means that each student visited an average of 16-17 times the online page (as many as the teaching weeks). The contents of the e-class were viewed 1464 times during this period and the total duration of the interaction of trainees with the electronic class is approximately 1050 hours. On average each visitor spent more than two hours per visit. The following Figure 1 shows the variation in traffic in the period of our study.

Αριθμός Προβολών και Διάρκεια

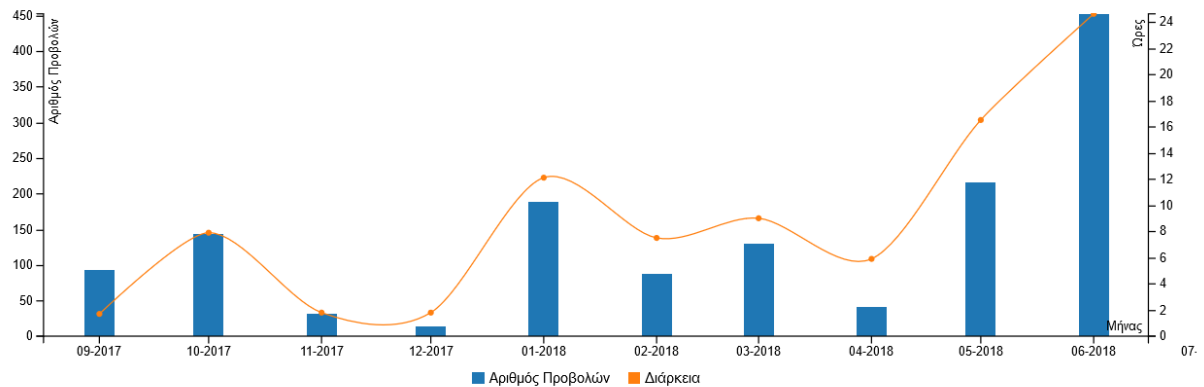


Figure 1: Number of Views and Duration of Each Visit at the E-Class During the School Year 2017-2018

From Figure 1 we notice that the traffic of the e-class starts dynamically in September and continues in October, while in November weakened. The reduced traffic in November is attributed to the students' focus on the exams that are taking place during this period in core courses of general education, so they withdraw their interest in elective courses temporarily. Similarly, reduced traffic in December is due to the upcoming Christmas holidays. Then we see an upsurge of interest in January, as students free from the stress of test begin to engage more with learning objects of their personal interest. Their interest remained undiminished until June 2018, when it culminated due to final examinations. The seasonal decline of April is attributed respectively to Easter holidays.

The above elements demonstrate the functionality of blended learning classes, where pupils attend lectures at school, but before the lecture, they studied themselves at home the theoretical framework. Especially in the period after January 2018, university trainee students came up with experiential educational material and experimentation, so the students' interest was reinforced even more. In Figure 2 below, we observe the distribution of the subsystems that attracted the students' interest. The interest is monopolized by the "thematic units" with a percentage of 60%, where the theory of each module is uploaded and the "Documents" with 26%, where the slides of presentations are posted along with additional educational material, audiovisual material etc. The next options-subsystems in percentages are the "announcements" (obvious reason) and the web links with informative-educational material. The individual traffic graphs (respectively of Figure 1) for the "thematic units" and "documents" follow the general trend depicted in Fig. 1.

Προτίμηση Υποσυστημάτων

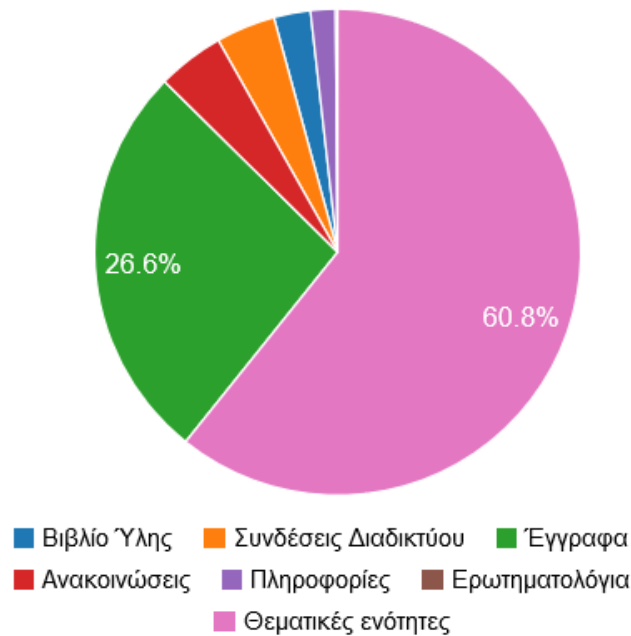


Figure 2: Preference of Options – Subsystems by Pupils

As far as concerns the functionality of Flipped Classroom, we cite Figure 3 below, where we study a specific, randomly selected week in October.

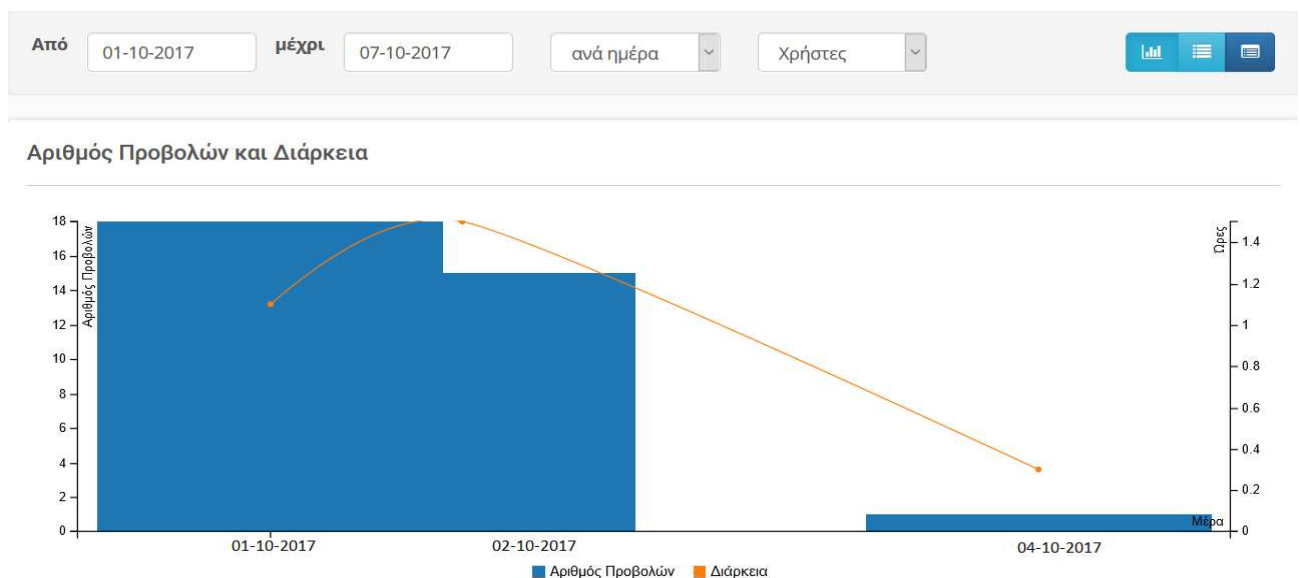


Figure 3: Number of Views and Duration of Visits During the Week 1-10 to 7-10 2017

From Figure 3 we notice that the traffic of the e-class presents high values on the 1st of October (Saturday) and on Sunday, October the 2nd. The course of "Geology and natural resources management" took place on Mondays and Thursdays. So, we can easily see that on Sunday, October 2 as well as on Wednesday, October the 4th 2017 we have high traffic from students-visitors at the e-class wishing to prepare themselves for the next day's lesson. This confirms the functionality of the flipped classroom, but also of that of blended learning, because we can observe that during 2nd of October 2017, a day that took place a face to face teaching we have additionally an intense traffic in the electronic class. Finally, it should be pointed out that the proposal for instruction incorporating of blended learning and flipped classroom, as well as all complementary and educational material, was approved by the National Official Committee DEPPS (ΔΕΠΠΣ) and the Supervising-Scientific Committee EPES(ΕΠΕΣ) of the mixed Experimental School of the University of Patras.

The E-Class of the Course "Didactics of the Natural Sciences». Quantitative and Statistical Research

The e-class of the University elective course of the spring semester entitled: "Didactics of the Natural Sciences" can be accessed from the following address: <https://eclass.upatras.gr/courses/PDE1524/>. The specific online class had a total of 69 registered students, its content was screened about 6500 times, while the page visited a total of 1577 times. This means that each student visited the e-class 22-23 times on average and viewed its content more than 1000 times. As shown in Figure 4, traffic in the electronic class was continuous, while visits lasted comparatively much more time.

Αριθμός Προβολών και Διάρκεια

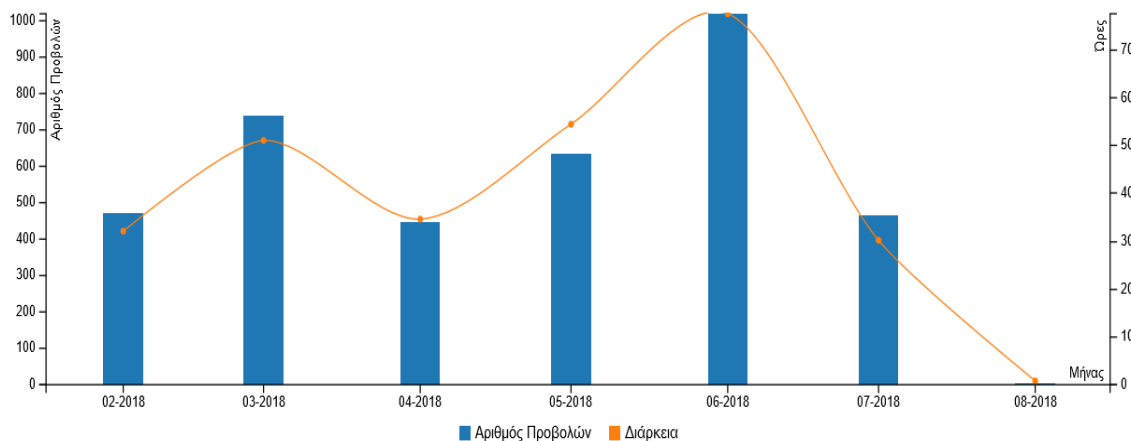


Figure 4: Number of Views and Duration of Each Visit at the E-Class of the Course "Didactics of Science"

The trend that we observe shows the familiarity of university students in relation to the school pupils in distance learning models and blended education. About the preference of subsystems by students, we observe differentiation compared with pupils. The university students focused mainly on the "documents" (material to be examined) with a percentage of 46%, in the "thematic units" with only 25%, while the "diary" distracts 22% of students' preferences. Finally, although the "philosophy" of the flipped classroom is not widespread in academia and within university students' lobbies, however, we encouraged students to adopt it. The course of "Natural Sciences Didactics" was a three-hour course of which one hour was dedicated to laboratory exercises. The laboratory was taking place each Tuesday so in the past days

the Professor the instructor was posting the worksheets for the laboratory exercises on the e-class and students were called to visit, read and download themselves the educational material. Next day university students were encouraged themselves to implement and perform an experiment in the laboratory following the steps described on the worksheet, concluding to reasonable conclusions and support their findings. The laboratory was mainly related to physics, such as calculation of the density of several essays, calculation of movement speed of a moving body, measure the pendulum period, achieve powers balance, etc. The university students responded exceptionally and adopted for the most part the proposed way of working and participating in the course. Indicatively in Table 1, we mention the number of visits to the e-class during the period 3-8/3/2018. It is recalled that 6/3/2018 was Tuesday, i.e. the laboratory workshop's implementation.

Table 1: Number of Views Before, During and After the Implementation of the Workshop in the Indicative Period 3-8/3/2018

	Before the Lab-Workshop			Workshop-Lab Day	After the Lab-Workshop	
	3/3	4/3	5/3		7/3	8/3
Date	3/3	4/3	5/3	6/3	7/3	8/3
Number of views	71	32	39	18	28	30

We notice that the students visited the e-class the more, before the day of the lab-workshop's implementation to study the worksheet and prepare for the implementation of the laboratory exercise. Of course, students' interest remains high throughout the semester, which confirms the familiarization of students with distance and/or blended learning.

CONCLUSIONS

Initially, we observe that school students are not as familiar with distance or blended learning as university students are. This seems to agree with former studies by other researchers (AkkoyunlukaiSoylu 2008), (Τόκη, Σύψα, Α. Παγγέ και Γ. Παγγέ 2013), (Σύψα, Λέκκα και Παγγέ 2013) When school students are revisiting the online class they spend less time than the university students. But, although school student's residence time is less than university students, their interest seems to be focused on gaining more knowledge and information, as reflected in the "thematic units", while university students focus on the "documents", which contents the main subject of their written examination. Hyperlinks with additional educational material are equally attractive to university and school students alike.

As far as concerns the flipped classroom method, it initially seemed unattractive to both university and school students. This finding coincides with similar findings from other researchers (Μακροδήμος, Παπαδάκης, & Κουτσούμπα 2017), (Gariou-Papalexioet. al. 2017). However, with the appropriate encouragement and motivation, both pupils and students responded positively to the challenge. To achieve this, we had to enriched both elective courses with experiential, and hand – on activities. In the High School, we incorporated presentations of rocks and fossils from trainee students, while we simultaneously uploaded presentations with visual-photographic material and explanatory diagrams. Our measurements show that the students wished to be prepared, which reflected by questions they were practicing during the class teaching under their physical presence. In Higher Education was even more difficult to operate the flipped classroom model, but incorporating in the core of the course a laboratory time we succeeded, through uploaded laboratory worksheets to involve a large number of students in the flipped classroom processes.

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