A FORCED MIGRATION DUE TO COVID19 FROM A FACE-TO-FACE UNIVERSITY EDUCATION SERVICE TO A TOTAL ONLINE LEARNING MANAGEMENT SYSTEM SUPPORT: UDELAS-PANAMÁ STUDY CASE

D. Quijano[1,2], R. Gil-Herrera[2]

[1]*Universidad Especializada de las Américas (PANAMA)*
[2]*Universidad Americana de Europa (UNADE)*

Abstract

The pandemic forced the Specialized University of the Americas (UDELAS) of the Republic of Panama, to transform an almost 100% face-to-face university to 100% virtual environment in approximately three weeks, since many teachers and students had no prior knowledge or experiences in internet education. The challenge arose to achieve this transformation with non-existent resources and technologies to meet the change in an extremely short period of time. The hypothesis at that time was to bet on the implementation of different technological options instead of one, because in the absence of one, the others would serve as an alternative. Three technological options were chosen: Moodle, Classroom and the so-called Combined (Google G Suite For Education applications without using Classroom or Moodle) for implementation purpose. Methodologicaly,through an analysis of the databases used at the end of the first semester, as main results it was found that 36.78% of teachers kept online teaching activity througout e-classrooms implemented in Moodle, 19.96% in Classroom, 20.14% in both, 23.11. % in none of either both and finaly up to 85.25% used Meet for videoconference teaching . As an operational conclusion, all UDELAS courses were completed, it confirms the hypothesis that allowing different technological alternatives under a strict regulatory framework, in a situation of great uncertainty and few institutional resources, helped teachers and students adapt to the new and required circumstances.

Keywords: Crisis, LMS, e-learning, System migration, Pandemic

1 INTRODUCTION

Law No. 139 of April 2, 2020 of the National Emergency of Panama forced the mandatory confinement and prohibit activities that involved crowds or meetings. Therefore, teachers could not approach the offices to sign their contracts, students were prohibited from paying at the university offices, and finally, they could not receive and meet their courses under face-to-face way as they used to do at UDELAS institution.

Three essential challenges were anticipated for the UDELAS normal operation: how to pay teachers? How to enroll students without making the payment and appearing on the teachers' lists? And finally: what applications or platforms would it be used to teach online classes?.

In March 2020, there was little literature on experiences of universities in facing the crisis as a result of the closure of face-to-face activities, for May 2020 Abreu [1] affirms "The publications in scientific journals on the subject being discussed are almost nonexistent or probably in full development. " However, researchers from China had the opportunity to publish some experiences accompanied by very general recommendations, one of which warns of having a plan B and C [3]. The priority of the universities was to start and attend the courses, temporary mitigation strategies were developed to save time and observe the evolution of the pandemic while trying to understand the Covid-19 disease [5].

The average time to implement an online course is six to nine months, positive experiences in online training consume a lot of time and resources [1], therefore, UDELAS was fully aware that the courses taught online in response to the pandemic have different results tfrom the learning products of previously planned online courses.

Abreu [1], referring to Hodges et al [7] affirms "emergency remote teaching (ERE) is a temporary change from the normal delivery of instruction to an alternative mode of delivery, due to crisis circumstances" and emphasizes the distinction between planned e-learning and ERE.

The goal was not to install a complete online education system in less than three weeks, but to build a temporary solution quickly and easily to configure during an emergency period. According to Abreu **[1]** "When emergency remote teaching (ERE) is understood in this way, it can easily be differentiated from 'online learning'"

In the UDELAS case, in a very short time, had to enable 2,514 virtual courses and integrate about 9,882 students and 1,112 teachers, many of them with little or no previous experience in virtual education.

In the regional experience, Peru **[6]** and Ecuador **[8]** can be cited as comparable examples with the conditions of their public universities like UDELAS campus and resources. They opted for solutions like UDELAS case, combining solutions using videoconferences and platforms.

UDELAS, at the beginning of the pandemic, did not have enough resources or time to expand the technological capabilities of Moodle servers. In addition, there was little time to train many teachers and students with zero experience in online classes.

Two options were raised: to continue or to suspend classes. Different effects of continuing classes online without the necessary preparation were evaluated, especially in the aspect of learning results. On the other hand, the effects of suspending classes were analysed: is it better to keep students receiving classes online than to leave them without any purpose given to leisure and possibly to break social distancing?.

Faced with this situation, a quick diagnosis based on previous records of the use of Moodle showed several teachers who were knowledgeable about the Moodle platform, either in their teaching role or when they were graduate level students. The question that the authorities asked themselves: what will happen to those teachers and students who do not have the previous experiences and knowledge in online education.

On the other hand, before the pandemic, the UDELAS authorities had reached a license Agreement with the Google company to use the G Suite For Education license, which provides the following advantages: 1) unlimited space in the file store with Google Drive; 2) unlimited time in the use of the Google Meet videoconferencing application; 3) use without restrictions of Google Classroom; 4) use without restrictions on Google Chat; and 5) use of institutional Gmail. Likewise, G-Suite offers many other useful applications for teaching classes and developing collaborative strategies as well as active methodologies. This agreement did not imply costs for UDELAS.

None of the aforementioned Google applications require teachers' and students' actions to download and install new components or to open a new account. It is enough to have an institutional UDELAS Gmail account to reach immediate access for teachers and professors to each of the Google applications. But, before the pandemic, these advantages were little used by teachers and undergraduate students, especially those dedicated exclusively to the face-to-face modality.

UDELAS, based on the hypothesis that a diversity of technologies can help teachers and students adapt themselves to change, adopted the strategy of approving different technological options that teachers could choose in order to teach classes. However, it was taken into account that students should not be exposed to a load of excessive learning of technologies, which could happen if each teacher uses the technology that seems best to them. Due to that, the number of technologies was limited to three options by means of the norm published in the Academic Agreement No. 005-2020 [4], in which three technological options were institutionally approved. Specifically, they are the following: a) the Moodle LMS, b) the Classroom platforms, and finally, c) a combination of Google G Suite For Education applications called Combined that uses apps other than Classroom, like Gmail, Google Meet, Google Chat, and even WhatsApp. This last option was designed for those teachers with high digital skills deficiencies.

The use of three options took place in a regulated and supervised framework that guaranteed to avoid excess of multiplication of technologies in an uncontrolled way and without the possibility of evaluating their incidence. The selection of the three alternatives has two reasons:

1. Moodle and G Suite For Education allow activities to be recorded in their databases, which, since they can be accessed by UDELAS authorities, can show valuable information for making decisions in the second semester. In the case of Moodle, it allows direct access to its database, and in the case of Google, it also allows database access the license is of the G Suite type.
2. On the other hand, Moodle is a well-known and widely used tool, but only by an insignificant part of the university teachers. It was also decided to use G Suite For Education, because it is also a well-known technological option in the school and university environment. Its main

advantage is that it can be accessed immediately by teachers and students with institutional accounts

An interesting study by Bacher-Hicks **[2]** used high-frequency Internet search (Google Trends) to show how American households searched the Internet for alternative learning when schools closed due to the pandemic. According to Bacher-Hicks **[2**] "By April 2020, the search intensity nationwide for online learning resources by parents had doubled." The most popular of these search sites was Google Classroom, and then Khan Academy. In Panama, the University of Panama, the largest public university in the country, reported the use of Google Classroom, however, each teacher was allowed to create by personal accounts, it does not allow access to the application's database to know or tracking about the use of it.

Moodle, in normal conditions, is a tool that can be learned with enough time, but it requires the teacher to enter a free Moodle site, create the account and begin to understand its functions independently. On the other hand, for the teacher with little digital skills and little previous knowledge in online education, it is easier to access Classroom and other Google applications immediately from their institutional Gmail account, for this purpose, it does not require installing new components or creating new accounts by users, un fact, everything "is at hand" ready to experiment. It was assumed that Classroom and the rest of the collection of G Suite For Education applications allow faster autonomous learning.

To implement the use and access to Classroom and the rest of the Google applications, 12,000 institutional Google accounts were generated through the G Suite For Education license in the first week of March, during the student registration period before the start of classes, one for each student, automatically.

In order to avoid an individual and slow distribution of the institutional email accounts, the accounts were constructed as follows: name.surname.dig@udelas.ac.pa, the value dig refers to the last two digits of the ID (identity document or passport), in such a way, in the case of the same names and surnames, they can be differentiated by the latter. Next, on the UDELAS website dedicated to students, called Student's Corner your institutional Gmail account and password appear. When the student enters the website with his/her username and password, she/he can see the address her/his institutional email account and activate it.

The same method was used for the teachers; they were generated automatically and appeared on the UDELAS website for teachers called Virtual Notebook, in which the institutional email account appears.

In this way, both the student and the teacher were able to access the following applications: Meet (video conference), Classroom, Google Drive, Google Chat. Moodle and other applications that help the training process.

It was hoped that, with the multi-technology strategy, all teachers would be able to start and finish all courses scheduled for the first UDELAS semester.

Finally, as the main objective of the study is to know if the UDELAS was able to complete all the courses of the first semester of the undergraduate level of 2020, through the strategy of approving the use of different but controlled e-learning technologies.

The specific objectives are:

- To identify if all the teachers assigned to the first semester courses were able to adopt any of the approved technological options and in what proportions.
- To evaluate if all the courses were satisfactory completed.
- To identify if the age factor shows groupings by age range in the category: "did not use any technological option".

2   METHODOLOGY

The study is descriptive with a quantitative approach through the analysis of data extracted from the two platforms (Moodle and Google Apps Scripts). It was carried out from the beginning of the first semester in March until the end of July 2020; in order to know the usability of these by the teaching staff that taught the courses in the first semester, a critical period due to little knowledge of the causes and effects of the pandemic.

The target population was the teachers who taught graduate and undergraduate level courses in the first semester of 2020 at UDELAS.

The study had the teaching population total in database recorded in platform: 1,112 teachers who attended 2,514 courses.

For the Moodle platform, the information was extracted directly from the database (MySQL) of each of the three server computers. Thus, the SQL script produced a table with four attributes (userid, UserLogins, Instructor, and username). Here username is equal to your institutional email account, key in future matches with the information extracted from Classroom. Despite the simplicity of the SQL script, each one took about an hour to process the data and produce the results.

The purpose of this recovered platform data was to know the teachers who appear with the teaching role and were assigned in a classroom on the Moodle platform, and who accessed their classroom between the period March to July 2020.

The Userlogin attribute is the value of the number of times the teacher accessed their classrooms. Given that an academic semester is made up of four effective months of classes (without including the enrollment process and final exams), this adds up to 16 weeks of classes, the teacher is expected to enter their classes at least once a week. So, it was taken as a reference to consider if the teacher attended his classes using the Moodle functions at least once a week. Those teachers with less than 15 accesses in the four months, were considered that they did not fully use Moodle activities in their development of virtual classes compared to previous records of use of virtual classrooms at the graduate level, the only previous information available to compare in the context of UDELAS.

For the Google Classroom platform, the challenges were greater, since the reports shown by the Google application administration console, in the university domain, are not very detailed. The problems encountered to generate the report are:

• Not all classrooms were created for first semester graduate degree and undergraduate degree teachers, some classrooms were created for testing purposes or for other purposes or levels.

• Classrooms were created by an account that does not belong to the classroom teacher; the classroom creator later added the teacher who taught the class. Therefore, the report only shows the creators of the classrooms.

The initial decision to contain the accounts that belong to teachers in administrative entities in the UDELAS domain of accounts created for that purpose, allowed to distinguish the accounts of the teachers from the student or administrative accounts and authorize only the teachers to create the classrooms in Classroom application.

Therefore, it was decided to use the programming resources of the Google Classroom API, in Javascript language, directly in the Google Apps Script computer environment, which is accessed through the institutional administrative account.

A first script gave us the list of all the classes with the information of the course id and its creation date, in total 3,801 classrooms.

The creation-date is an attribute useful to later help filter those classrooms that are from the first semester.

The API classes used are: Classroom.Courses.list (), provides the list of course type objects for each course. And list.courses [i] .courseState, returns all the information of each course (id, creation date and others).

The results were recorded in a Google spreadsheet that was later downloaded as an Excel file.

Two attributes were added containing the year and the number of the month extracted from the creation-date of the classroom.

The next step was to extract all the accounts with the teaching role (role = 3) that are part of each classroom, since it is not necessarily true that the creator of the classroom is in turn the classroom teacher, therefore, in each classroom, in addition to the creator (who is usually a teacher), it is possible that there is also the teacher invited to the class.

A second script opens the spreadsheet document that contains the list of classrooms and their creation date, and used two "for" that as it reads the course id, launches another API that extracts all the teachers of said course, using :

var teachers = Classroom.Courses.Teachers.list (rows [j] [0]), brings up the list of teachers for each course id.

It turned out to be a process that exceeds 30 minutes and that triggers the suspension of the process by Google policies. For this reason, the file with the list of classrooms was divided into three parts, in such a way that each part was processed in the script without exceeding 15 minutes each. The result was three Google spreadsheet files downloaded and converted into Excel spreadsheets and merged into one.

On the mentioned Excel file, we filter by months: April, May, June, and July (4,5,6 and 7). Contains all courses and accounts (creators and guests). The document was reduced to 1,247 records. It cannot yet be stated that this is the number of courses or teachers, since there are courses that are repeated since they contain two or more accounts with the role of teacher or creator, and in turn there are accounts that have created or participate in more than a different course.

The duplicates are then removed by the Email column. There were 552 registrations, first semester teachers and others who are not.

A third list is the one generated by the information systems of the Information Technology Directorate. It contains the professors who taught classes in the first semester (those who placed notes on the students), which contains the column of institutional emails and the following were added: Faculty where he/she teaches class sessions(it can be more than one), age (crossing with the information from the Faculty Data Bank) and Headquarters.

A fourth list about the Meet sessions created by teachers was generated from the Google console: 28,618 sessions.

Four products were achieved in a first phase: list of teachers who taught classes in Moodle, list of teachers who taught classes in Classroom, official list of teachers who taught classes and list of teachers who generated sessions in Meet tool. The four lists are related by the email column (institutional account) and filtered by their participation in the months of the first semester, leaving only those of the first semester.

Then we proceeded to remove duplicate emails from each product to show only the list of teachers without repetition.

Finally, using PowerBI and Excel, the information was crossed among the four products, in such a way that it resulted in a single list of professors officially assigned to the first semester along with the following columns: email, age, location, faculty, if it appears in the list of teachers who appear registered in Moodle classrooms, if it appears registered in the list of teachers who appear registered in Clasroom classrooms, if it appears in the list of Meet sessions.

3 RESULTS

The unsegmented results show (see Table 1) the amounts and percentages of teachers registered in different options to teach classes during the first semester of 2020 at the bachelor's level, which were approved by UDELAS. In the **"TotalMoodle"** column those that are registered in Moodle classrooms appear, but they may or may not also appear in "Classroom" classrooms. In the "**TotalClassroom"** column is the number of teachers that appear registered in **"Classroom"** classrooms, but may or may not appear in Moodle classrooms as well. The column **"Both"** shows the number of teachers that appear in both. The column **"None"** shows those that do not appear on any platform, possibly represents the Combined option. In the "**OnlyClassroom**" column are those that only appear in **"Classroom"** classrooms. In the "**OnlyMoodle"** column it shows the number of teachers who only register in Moodle classrooms. Finally, the **"Meet"** column shows the number of teachers who opened a Meet session, which is widely used for video classes. The percentages are calculated based on the total number of teachers shown in the first column.

Table 1. Teachers registered in different options approved to teach classes.

Number of teachers	TotalMoodle	TotalClassroom	Both	None	OnlyClassroom	OnlyMoodle	MEET
1112	633	446	224	257	222	409	948
	56.92%	40.11%	20.14%	23.11%	19.96%	36.78%	85.25%

In the case of the teachers in the None column, the records were crossed with the data contained in Meet, which showed a result of 187 records that opened sessions in Meet. In the figure 1, is shown the proportions of teachers recorded in some one technological option.
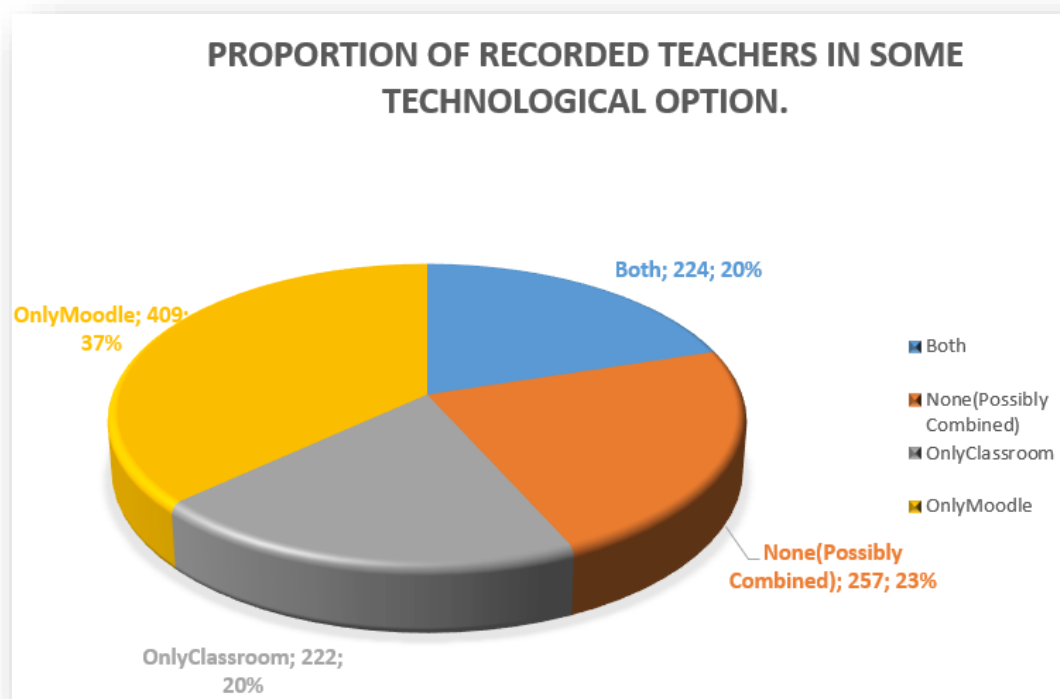
Figure 1. Proportion of recorded teachers in some technological option.

Likewise, on Table 2 shows the results segmented by campus, with Panamá being the central campus of the university located in the country's capital. Veraguas and Coclé campus reflect a high number of teachers in Moodle classrooms. Colón is the only campus that registers more teachers in Classroom than in Moodle. On the other hand, the Azuero location, the campus that opted for the official use of Classroom, the figures reflect very even results. Also striking in Azuero is the high percentage of teachers not registered in either of the two platforms. Lastly, use of the Meet application remains very high across all campuses.

Table 2. Teachers registered in different options approved to teach classes segmented by campus.

Campus	Number of teachers	TotalMoodle	TotalClassroom	Both	None	OnlyClassroom	OnlyMoodle	MEET
Panamá	448	57.59%	40.18%	19.20%	21.43%	20.98%	38.39%	81.25%
Veraguas	209	71.77%	33.49%	21.05%	15.79%	12.44%	50.72%	87.08%
Chiriquí	199	51.76%	46.73%	24.62%	26.13%	22.11%	27.14%	88.94%
Colón	102	48.04%	56.86%	27.45%	22.55%	29.41%	20.59%	84.31%
Azuero	84	29.76%	27.38%	7.14%	50.00%	20.24%	22.62%	89.29%
Coclé	70	68.57%	31.43%	15.71%	15.71%	15.71%	52.86%	91.43%

Finally, Table 3 shows the results segmented by age. The highest number of teachers who taught classes in the first semester at the undergraduate level in 2020, are located in the range of 31 and 50 years of age. The data for the age range under 31 years of age are striking, being the range with the highest number of teachers who do not use any of the platforms (Moodle or Classroom). It is the age range that shows the least use of the Meet application, although in general terms it is still very high.

Table 3. Teachers registered in different options that were approved to teach classes segmented by age.

Age Range	Number of teachers	TotalMoodle	TotalClassroom	Both	None	OnlyMoodle	OnlyClassroom	MEET
Mayor de 70	53	49.06%	33.96%	11.32%	28.30%	37.74%	22.64%	83.02%
Menor a 31	55	56.36%	27.27%	16.36%	32.73%	40.00%	10.91%	74.55%
Entre 61 y 70	154	57.14%	37.01%	19.48%	25.32%	37.66%	17.53%	83.12%
Entre 31 y 40	233	54.94%	42.06%	21.46%	24.46%	33.48%	20.60%	89.27%
Entre 51 y 60	277	55.96%	42.24%	19.86%	21.66%	36.10%	22.38%	87.36%
Entre 41 y 50	340	60.29%	41.47%	21.76%	20.00%	38.53%	19.71%	83.82%

It cannot be concluded that all the teachers registered on the Moodle platform actually taught their classes on it, it is possible that there are teachers who combined the use of both, this is because UDELAS established Moodle as its official platform at the beginning of the pandemic, and maintains the same condition although it allowed, temporarily, the use of the other two options (Classroom and Combined). All the classrooms courses of the first semester were created in the Moodle servers except for the Azuero campus and the Faculty of Biosciences and Public Health (one of the four current ones) that opted for the use of Classroom, hence a greater use of Moodle in the rest of the campuses. It is possible that 20.14% of the teachers who registered in both platforms were already registered in Moodle and opened another account in classroom where they developed the usual activities with the students while maintaining the study content in Moodle. Classroom was authorized as an option, therefore teachers were not obliged to use said platform, so it is concluded that when registering a classroom in the Classroom platform, the reason is an interest in using it. In the case of the **"None"** teachers (they did not register in Classroom or Moodle) it is suspected that they are in the Combined option, of the 256 in the None category, 187 opened Meet sessions. The percentage of Meet is so high that it suggests that, combined with WhatsApp and email, they were used to teach courses.

4 CONCLUSIONS

From the results it can be concluded that the teachers chose to attend the educational mission through: Moodle, Classroom and Combined option, and in all of them, they had a strong support from Meet. The None column (neither Moodle nor Classroom) assumes the use of the Combined option. When adding the options None, OnlyCLassroom and Both, they total 63.22%, what would have happened if UDELAS had opted for a single platform? Surely a large number of teachers, mainly those who used the Combined option, would have suffered much more to adapt their classes online.

Regarding age to select any technological option, no notable differences are observed between the different age ranges in the use of this three options, all age ranges show a similar pattern.

All the teachers hired for the planned courses finished their classes and turned in the students' grades. The crossing of the information showed that all used at least one option of the three approved by UDELAS.

The hypothesis was confirmed that maintaining another alternative, in addition to Moodle, was correct, at least to help in the adaptation work by teachers and students to teach classes in a context of abrupt change by pandemic reasons and with an unaccustomed teaching and student staff to carry on virtual classes, with which it was possible to cover all the opened UDELAS courses of the first semester.

ACKNOWLEDGEMENTS

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