

Switching from face-to-face to electronic-mediated education caused by COVID-19 pandemic: An analysis of student perceptions

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Abstract

Mozambique, like several other countries in the region and all over the world, faces the dilemma of the need to guarantee the minimum learning conditions for students during the state of emergency due to COVID-19. It is in this sense, which the present study aimed to analyze the perceptions of students of the Pedagogical University of Maputo (UP-Maputo) in the use of electronic platforms as a resource to support classroom teaching during the State of Emergency. The research had a quanti-qualitative character, where the analysis and control of the different variables was foreseen. It consisted of collecting information on the objectives of operationalizing the teaching and learning process in the face of the COVID-19 pandemic, through the application of an electronically administered questionnaire. A sample of 1787 students was obtained, corresponding to 13.61% of the universe of students enrolled in the year 2020. The survey showed that most of the students, around 64% used some electronic platform to support their teaching and on-site learning process, after the declaration of a state of emergency the percentage of users of electronic platforms increased to 100%, highlighting the use of WhatsApp to the detriment of the others (SIGIUP, MOODLE® Institutional, Google Classroom and ZOOM®). The device they use, because 95% of the students access the platforms using their mobile phones, justifies the massive use of WhatsApp. Regarding the use of different electronic platforms, most of the students revealed a platform usage that varies from "Many Times" and "Always". Students refer to the need for training in the use of the different platforms made available to them to support their teaching and learning process. The research made it possible to conclude that students are aware of the need to appropriate the new form of teaching they are subject to, despite having significant financial difficulties in the acquisition of internet packages and in the use of some of the electronic platforms made available for learning.

Keywords: COVID-19; Electronics platforms; State of Emergency; Teaching and Learning.

1. Introduction

In Mozambique, the National Education System (SNE), as in many other countries all over the world, was challenged regarding the emergency measures imposed by COVID-19. The perspective of implementing Distance Learning in Mozambique is referenced in the Strategic Plan for Distance Education (PEED) which defines Distance Education as being “the teaching model that is distinguished by the separation between students and teachers, use of technology to mediate learning, bidirectional communication that allows interaction between students, teachers and tutors and the possibility of face-to-face meetings for tutorials.” (PEED, 2013).

UNESCO (1998) refers to the need for Higher Education Institutions (HEIs) to adapt to the Knowledge Society through the adoption of different ways of teaching and learning taking into account a profound impact in terms of methodologies, practices and paradigmatic, organizational approaches, pedagogical and social aspects of each one.

The declaration of the State of Emergency drastically changed the face-to-face teaching system, with Higher Educational Institutions defined as a result of Presidential Decree No. 11/2020 of 30 March, the continuation of Teaching and Learning Processes through the use of electronic platforms. In this sense, each of the HEIs has defined one or a set of electronic platforms in order to guarantee the effectiveness of the teaching of classes during that period. It was from the above that this research was developed, aiming to analyze the perception of students from the Pedagogical University of Maputo (UP-Maputo) in the use of electronic platforms as a resource to support teaching and learning during the term of the State of Emergency.

2. Digital Platforms and Learning

Digital learning platforms are virtual environments created from Information and Communication Technologies (ICTs), which use the Internet as a means of diffusion and communication. The digital platforms offer a range of resources, which allow the management of academic activities, through the creation of classes, provision of communication tools between participants and the creation, in real time, of immersive and interactive environments (DELGADO; HAGUENAUER, 2010).

The use of digital platforms in learning is a challenge due to the lack of planning for its use in the Mozambican context. Ceccim and Feuerwerker (2004) draw attention to the fact that the prevalence of protagonism from the teacher, which in the traditional model, acts by reproducing a teaching model centered on the massive transmission of content, in which students are seen as recipients of technical-scientific information about a given content in a perspective where they are unaware of the active role in the teaching and learning process.

The current context requires changes in the teaching and learning process, characterized by the redefinition of the roles and places occupied by the different subjects involved in this process. Thus, it is up to the teacher to offer the respective distance from the position of sole holder of knowledge and also assume the role of apprentice (FREIRE, 1996). On the contrary, it is up to the student to assume a more active role, resigning the attitude of being a mere recipient of content and seeking autonomously the relevant knowledge to the problems and learning objectives. This stance implies, on the one hand, greater

responsibility on the side of the actors and particularly, greater autonomy in the construction of knowledge by the students (PALÁCIO; STRUCHINER, 2016). On the other hand LIMA, et all (2016), refer that users can develop the learning of the contents if they develop and believe that the system can contribute to improve their performance.

3. Methodology

This research was carried out at UP-Maputo. UP-Maputo is a Mozambican public higher education institution whose statutory mission is the higher education of teachers for all levels of education and other professionals in the field of education and related areas, research and extension. The research had a quanti-qualitative character, where the analysis and control of variables was made, which made it possible to access the degree of compression of the students regarding the use of electronic platforms to assist the teaching and learning processes.

Methodologically, the present research consisted of gathering information about the objectives of the operationalization of the teaching and learning process due to COVID-19 pandemic, through the application of a questionnaire that aimed to assess the perception of UP-Maputo students in relation to the use of electronic platforms to support the teaching and learning process.

The survey was conducted electronically, using Google Forms. The invitations to reply were sent by WhatsApp during April 2020, a period characterized by the implementation of the Presidential Decree and the validity of the State of Emergency due to COVID-19. The questionnaire was sent to WhatsApp groups in all classes of the University, that is, the questionnaire was sent to 13,127 students, which corresponds to the total number of students from the Pedagogical University of Maputo and we had 1787 questionnaires answered, which corresponds to a rate of responses of 13.61%. This response rate is considered excellent considering that for the size of the population in question (13,127 students enrolled in the academic year 2020) with a 95% confidence level and a margin of error of 5%, a sample of 374 respondents was sufficient.

The observation presented above is supported by the verification of representativeness of groups. For this purpose, considering a finite population (in this case 13,127 students), the following formula was used, considering the margin of error of 5% and the confidence level of 95%:

$$n = \frac{N \cdot \hat{p} \cdot \hat{q} \cdot Z^2}{\hat{p} \cdot \hat{q} \cdot Z^2 + (N - 1) \cdot e^2}$$

Where:

N - Number of people in the study population

n - Sample size

e - Margin of error (%). Smaller error margin requires larger samples.

Z - Confidence level (%). The higher the confidence level, the larger the sample (Confidence level of 90% - Z = 1.645; Confidence level of 95% - Z = 1.96 and, Confidence level of 99% - Z = 2.575).

\hat{p} - Estimation of the proportion of the population.

When there is no idea of the estimate of the population proportion, that is, what values of p and q the

research will reveal, it is assumed, hypothetically, $p = 50\%$ and $q = 50\%$, $\hat{p} \cdot \hat{q} = 0.25$.

$$n = \frac{13127 \cdot 0,25 \cdot 1,92^2}{0,25 \cdot 1,92^2 + (13127 - 1) \cdot 0,05^2} = 373,26$$

According to the sample size presented in the calculation above ($n = 373.36$), it is concluded that the sample used in the research is representative of the population ($n = 1787$).

The questionnaire had 8 questions between open and closed. It was divided into three parts: (1) identification, (2) use of electronic platforms to support the teaching and learning process before the declaration of a state of emergency due to Covid-19 and, (3) use of electronic platforms to support the teaching and learning process after the declaration of a state of emergency due to Covid-19.

In the first part, data were collected regarding the faculty that each student attends.

The second part sought to assess whether students had already used electronic platforms to support face-to-face teaching before the COVID-19 decree of emergency came into effect.

In the third part, students were asked about the electronic platforms they use during the state of emergency due to COVID-19 and about the devices they use to access these platforms as well as the frequency with which they use them under different prisms. They were also asked about the benefits and difficulties they encountered in using these platforms used by teachers to teach the subjects.

For the analysis of the research results, considering that the quantitative approach was chosen and that the questions in the third part of the questionnaire used the Likert scale, the Average Ranking (AR) was used to measure the degree of agreement of the students who answered the questionnaires. According to Malhotra (2011) and Laranjeiras, Albuquerque & Fontes (2011), in order to find the Average Ranking of each researched variable, based on the Liker scale analysis method, the calculation considers the division of the weighing average of each investigated category (item Likert) using the Likert scale, respectively presented (sum of responses for each Likert item).

$$\frac{P_1 \cdot X_1 + P_2 \cdot X_2 + P_3 \cdot X_3 + \dots + P_n \cdot X_n}{P_1 + P_2 + P_3 + \dots + P_n} = \frac{\sum_{i=1}^n (P_i \cdot X_i)}{\sum_{i=1}^n P_i}$$

Figure 1. Formula for calculating the Average Ranking.

In Figure 1, the element X_n refers to the value of each option of the item, which ranged from 1 to 5 (Totally Disagree to Totally Agree), and P_n is the number of students who chose the respective value. Therefore, there is a weighted average of the items in each investigated category divided by the number of students. The final value is the Average Ranking and can vary from 1 to 5. The Average Ranking shows the degree of agreement or disagreement of a particular item in the questionnaire on the Likert scale and is related to the frequency of the students' responses.

Cronbach's Alpha measure (Cronbach, 1951) was also used on questions six and seven of the questionnaire (Frequency of use of the different electronic platforms and electronic platforms adopted for the teaching of classes during the term of the State of Emergency due to Covid- 19). Cronbach's Alpha is

used to measure the reliability of a questionnaire applied in a survey. The alpha measures the correlation between responses to a questionnaire, by analyzing the profile of responses selected by the interviewees, that is, it is an average correlation between the questions (Hora, Monteiro & Arica, 2010).

According to Hora et al. (2010), using the same measurement scale, the coefficient is calculated from the variation of individual items and the variation of the sum of the items of each evaluator, using the following equation in figure 2:

$$a = \frac{k}{k - 1} \left(1 - \frac{\sum_{i=1}^k S_i^2}{S_t^2} \right)$$

Figure 2: Equation to calculate Cronbach's Alpha

The internal consistency of the questionnaire can be seen in the table below.

Table 1. Consistency of questionnaires according to the alpha value

Alpha value	Internal consistency
Greater than 0.80	Almost perfect
From 0.80 to 0.61	Substantial
From 0.60 to 0.41	Moderate
From 0.40 to 0.21	Reasonable
Less than 0.21	Little

Source: Landis e Koch (1977)

This metric was used to verify the reliability of the applied questionnaire, validate the questions asked and provide a greater degree of integrity to the research.

4. Presentations and Discussion of Results

This section presents and discusses, in a clear and detailed way, the results achieved by the research carried out, which was described in the previous section. For this, the data obtained in the questionnaire applied to students will be presented.

4.1 Cronbach's alpha

Cronbach's Alpha verifies the reliability that a questionnaire applied to users can achieve and thus ensure greater reliability to the results achieved. Based on this assumption, this metric was applied to questions 6 and 7. Question 6 of the questionnaire aimed to measure the frequency of use of the different electronic platforms. This question had 11 items with options for answers using the Likert scale (from Never - 1 to Always - 5). Similar to question 6, question 7 had 9 items with options for answers using the Likert scale (from Totally Disagree - 1 to Totally Agree - 5) and intended to gather the students' opinion regarding the electronic platforms adopted for the teaching of classes in the validity period of the State of Emergency due to Covid-19.

To obtain alpha, the variances of each item and the variances of the total scores of the items were calculated. To make these calculations, an Excel spreadsheet was used. The results are shown below.

For question 6, the results are as follows:

Number of items = 11

Sum of item variances = 1.4513769 + 1.624726112 + 2.347042888 + 1.778818546 + 1.866410678 + 1.887826931 + 1.511091891 + 1.938268957 + 1.998764941 + 2.02168243 + 1.698694388 = 20.12

Variance of the total scores of each respondent = 95.95

$$a_6 = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k S_i^2}{S_t^2} \right) = \frac{11}{11-1} \left(1 - \frac{20,12}{95,95} \right) = 0,87$$

For question 7, the results are as follows:

Number of items = 9

Sum of item variances = 1.458730889 + 1.766389039 + 1.989763789 + 1.909341514 + 1.797422722 + 1.867615049 + 2.120395106 + 1.852599559 + 2.06145923 = 16.82

Variance of the total scores of each respondent = 70.03

$$a_7 = \frac{k}{k-1} \left(1 - \frac{\sum_{i=1}^k S_i^2}{S_t^2} \right) = \frac{9}{9-1} \left(1 - \frac{16,82}{70,03} \right) = 0,86$$

It can be seen that the result of Cronbach's Alpha for question 6 is 0.87 and for question 7 is 0.86. According to the questionnaire consistency table for the alpha value of Landis and Koch (1977) and the classification scale based on values proposed by George and Mallery (2003), the values found are considered Excellent. This result shows that the questionnaire applied to users guarantees reliability to the results achieved.

4.2 Questionnaire results

The first question of the questionnaire sought to know the provenance of the students participating in the survey. The results are shown below in figure 3.

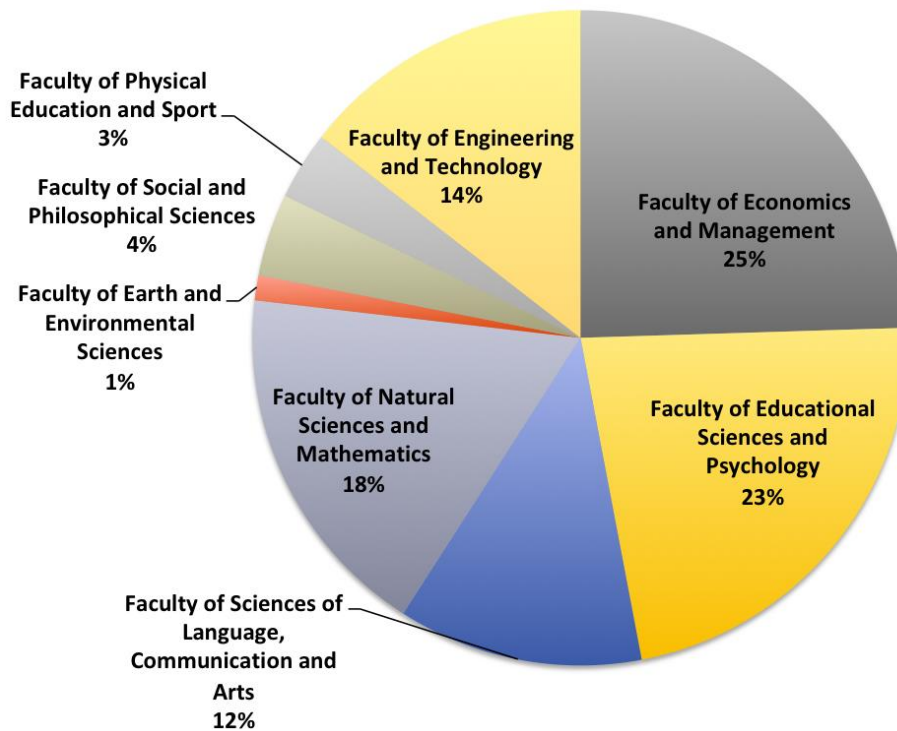


Figure 3: Distribution of students by Faculty

As can be seen in figure 3, the faculty that had the largest number of students participating in the research was the Faculty of Economics and Management with 25% of the total participants, followed by the Faculty of Educational Sciences and Psychology with 23%. The faculties with the lowest number of participants were the Faculty of Physical Education and Sport with 3% and the Faculty of Earth and Environment Sciences with 1%. These results are explained by the number of students that each faculty has. The Faculty of Economics and Management and the Faculty of Educational Sciences and Psychology contribute a total of 40.15% of the total number of students at the University while the Faculty of Physical Education and Sport and the Faculty of Earth and Environmental Sciences contribute only 10.25% (SIGEUP, 2020).

Students were asked if they had ever used an electronic platform to support the teaching and learning process before the Covid-19 pandemic broke out. If they answered Yes to the question, we tried to find out the platforms they used. The results are shown in the following figure.

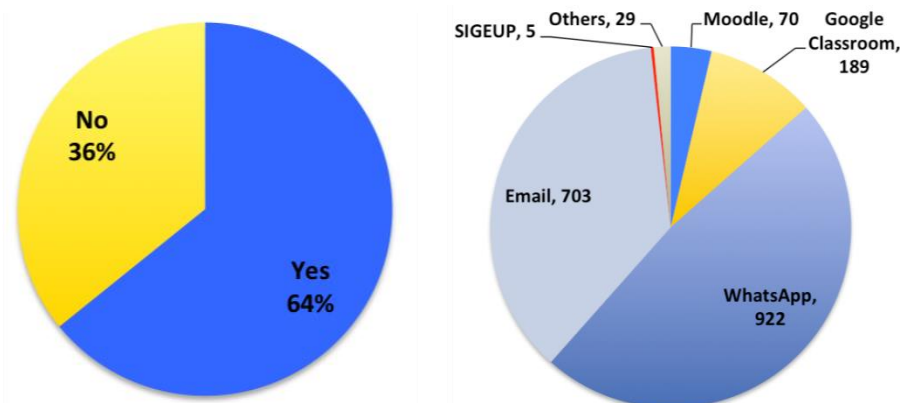


Figure 4: Distribution of students by Electronic Platforms used before the COVID-19 pandemic and the declaration of a state of emergency.

The results presented in figure 4 indicate that 64% of the students stated that they had used some electronic platform to support face-to-face teaching before the outbreak of the COVID-19 pandemic. Still, of the 64% of those who answered Yes, most of the students said they had used WhatsApp (48%) followed by Email (37%). Only 5 (five) students (0.4%) claimed to have used SIGEUP. With this question, a much higher percentage of students who answered SIGEUP were expected, since this platform is the official platform of the University and all students must be registered in it from the first moment they enter the University. According to Carvalho et al (2011), this reflects the fact that today students arrive at the university with good technological skills, which justifies the fact that most students have indicated WhatsApp and Email as the most used platforms. The students were then asked about the electronic platforms they were currently using after the outbreak of the COVID-19 pandemic and the declaration of a state of emergency. The answers are presented in the following figure.

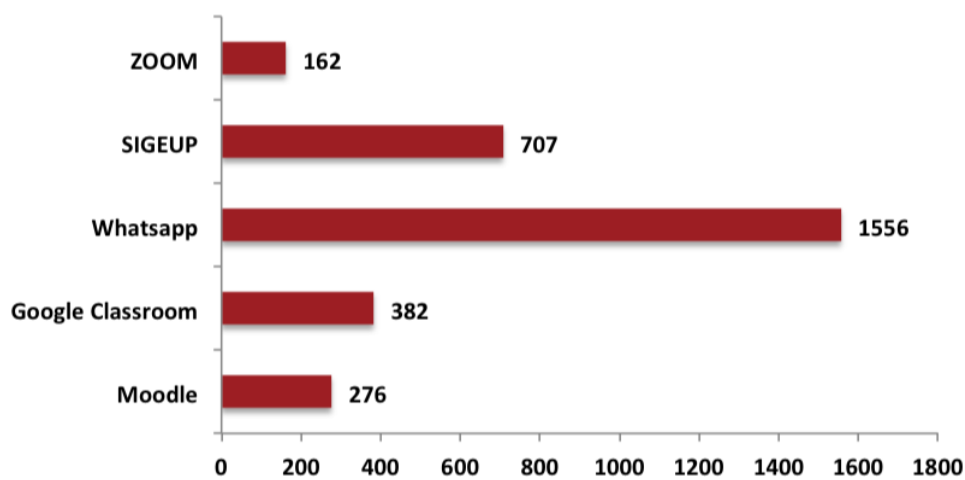


Figure 5: Distribution of students by Electronic Platforms used during the COVID-19 pandemic and the declaration of the state of emergency.

Similar to the results obtained in figure 4, the results presented in figure 5 show that about 87% of students answered that they are using WhatsApp as an electronic platform to participate in online classes. SIGEUP came in second with 39% of students stating that they are using this platform for classes. In last place were MOODLE® and ZOOM® with 15.4% and 9.06% respectively. This result shows that although the University suggested using MOODLE and SIGEUP, the financial condition of teachers and students determined the choice of WhatsApp for online classes. It should be noted that most students only have access to Internet using their cell phones.

This finding was confirmed by the answers to the following question in which we sought to know the devices used by students to access the educational resources made available by teachers on electronic platforms. The answers are shown below in figure 6.

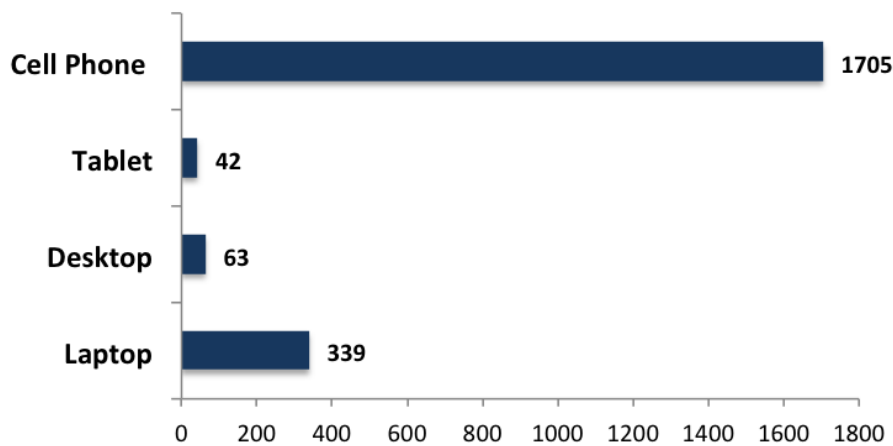


Figure 6: Distribution of students by device used to access electronic platforms

The data presented in figure 6 show that 95% of students access electronic platforms from their cell phones. Although this finding is associated with the students' financial condition, it is reinforced by the free internet packages for accessing WhatsApp offered by mobile operators. In addition, after the state of emergency came into force, mobile operators began offering free internet packages to students.

The following question aimed to measure the frequency that students use the different electronic platforms and was subdivided into 11 items using the Likert scale. Student responses can be seen in Figure 7 below.

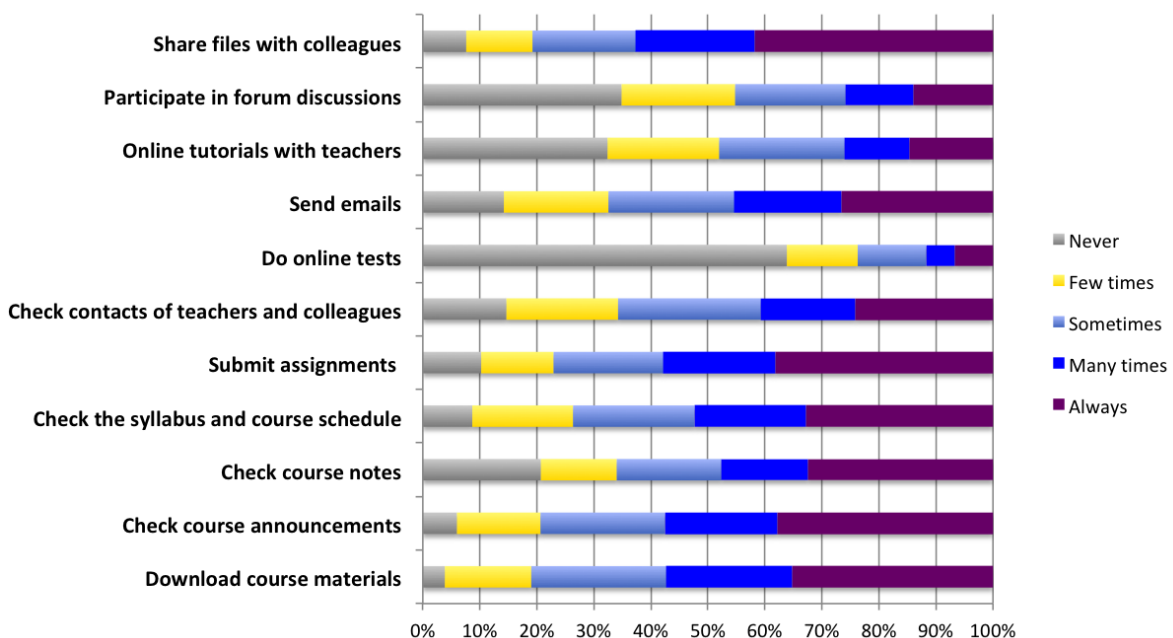


Figure 7: Frequency of usage of electronic platforms

For the analysis of the results of the students the method of analysis of the Average Ranking was used. This method was used to show the tendency of the students' answers in each item of the question. Table 2 presents the data obtained from the students' response to each of the five options, based on the Likert

scale for each item of the question.

Table 2: Average ranking of the items of frequency of use of electronic platforms

Item	Frequency of responses in each item					
	1	2	3	4	5	AR
1. Download course materials	69	271	423	394	630	3.697
2. Check course announcements	107	262	389	352	677	3.688
3. Check course notes	370	238	328	271	580	3.253
4. Check the syllabus and course schedule	155	316	380	351	585	3.501
5. Submit assignments	183	227	344	350	683	3.628
6. Check contacts of teachers and colleagues	262	350	447	297	431	3.159
7. Do online tests	1141	222	214	92	118	1.782
8. Send emails	254	328	395	336	474	3.251
9. Online tutorials with teachers	579	350	393	204	261	2.562
10. Participate in forum discussions	623	356	346	213	249	2.501
11. Share files with colleagues	136	208	324	373	746	3.775

For items 1, 2, 3, 4, 5, 6, 8 and 11, students have a frequency of use of electronic platforms that varies from “Many Times” to “Always”. This tendency of responses converges with the statement by Carvalho et al (2011) when he affirms that today's students arrive at the university with good technological skills. The items mentioned are characteristic of this type of students.

In items 7, 9 and 10, the frequency of responses pointed to “Few Times”. These items are largely related to the performance of teachers, who for the most part do not make the proper use of the concept of e-learning. Sending a set of PDFs on the Internet and answering students' questions by e-mail is not e-learning (Magano, Castro and Carvalho, 2008).

The next question was intended to collect the students' opinion regarding the electronic platforms adopted for the teaching of classes during the term of the State of Emergency due to Covid-19. The question comprised 9 items and the students' answers are shown in figure 8.

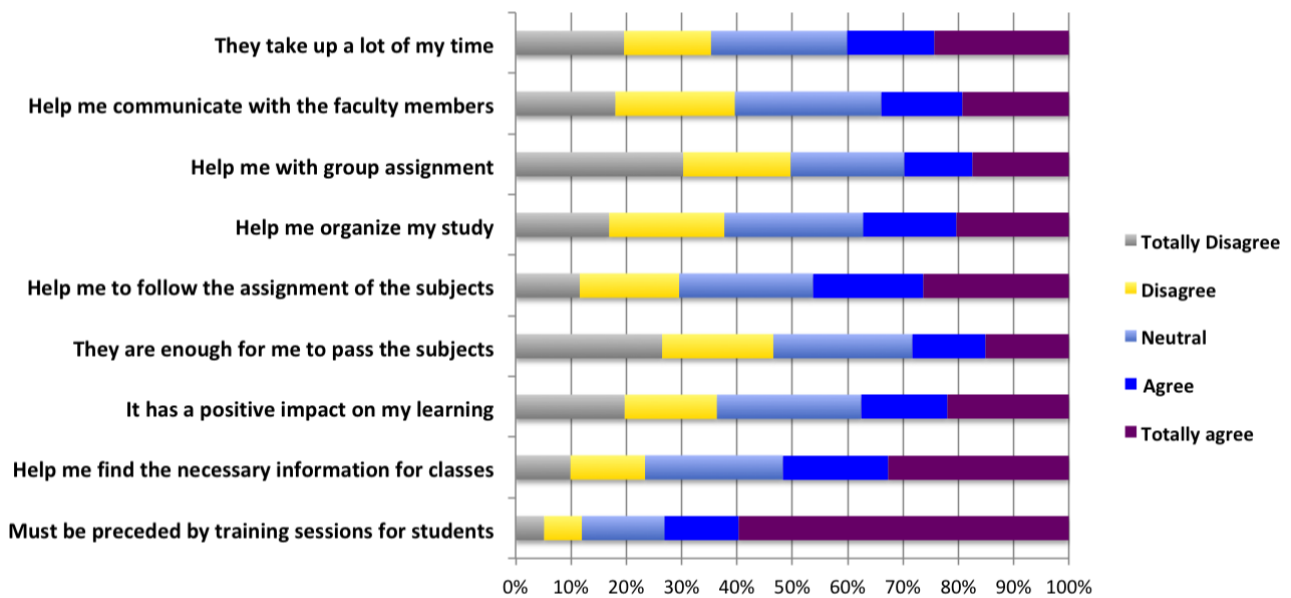


Figure 8: Students' perception of the use of electronic platforms

Similar to the previous question, the method of analysis used was Average Ranking. The analysis is shown in table 3.

Table 3: Average ranking of students' perception of the use of electronic platforms

Item	Frequency of responses in each item					AR
	1	2	3	4	5	
1. Must be preceded by training sessions for students	92	122	268	239	1066	4.156
2. Help me find the necessary information for classes	177	241	444	342	583	3.511
3. It has a positive impact on my learning	352	298	464	280	393	3.036
4. They are enough for me to pass the subject	473	359	448	237	270	2.705
5. Help me to follow the assignment of the subject	207	321	431	357	471	3.316
6. Help me organize my study	302	372	449	299	365	3.030
7. Help me with group assignment	541	347	366	221	312	2.673
8. Help me communicate with faculty members	322	386	471	264	344	2.956
9. They take up a lot of my time	350	281	439	283	434	3.095

In item 1 the students fully agreed that the use of electronic platforms for the teaching and learning process should be preceded by training sessions. These responses are reinforced by the position of Magano et al. (2008) when they state that the use of technology in the teaching and learning process must go through a high-level strategic and planned process involving the maximum levels of management and decision. It should be noted that in this specific case, the introduction of these platforms to support the

teaching and learning process was decided in a short time without giving preparation time to the various actors in the process.

In items 2, 3, 5, 6 and 9 the response trend was in agreement. Regarding items 4, 7 and 8, the students' responses tended to disagree. In these items, once again, the teacher plays a fundamental role that should be to guide students towards the effective use of electronic platforms in support of e-learning.

As a last question in the questionnaire, we sought to know from students what were the greatest difficulties they encountered in accessing the electronic platforms in use for the teaching of classes.

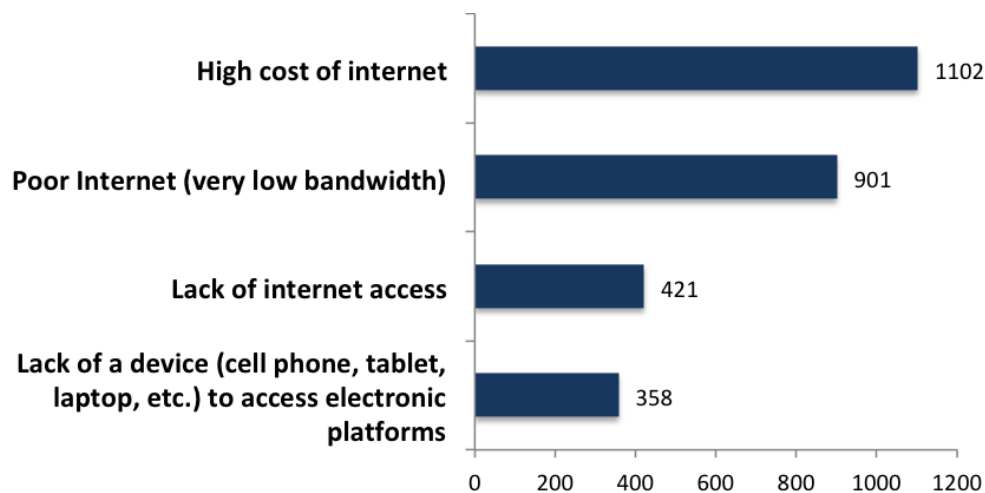


Figure 9: Distribution of students due to the greatest difficulties encountered in accessing electronic platforms

Regarding the difficulties of students to access electronic platforms, about 61.7% of them affirm that they face difficulties related to the high price of the internet. Considering the per capita income of the University's student population, this factor impacts the entire teaching and learning process. It is worth mentioning that mobile operators are, in this period, offering free internet packages to students. However, 50.4% of the students affirm that the internet offered by mobile phone operators has an exceptionally low bandwidth, which difficult activities related to the process of interaction and exchange of material for their learning. Approximately 23.55% of students have difficulty accessing the internet, which is basically justified by its cost. Few students have the lack of a device (cell phone, tablet, laptop, etc.) to access the different platforms available for learning.

5. Conclusion

The present research aimed to analyze the perception of UP-Maputo students in the use of electronic platforms as a resource to support face-to-face teaching during the State of Emergency due to the COVID-19 pandemic.

As a way to achieve the aforementioned objective, the research consisted of collecting data on the operationalization of the teaching and learning process in the face of the COVID-19 pandemic, through the application of a questionnaire for students. As a way of verifying and ensuring greater reliability of

the results achieved, Cronbach's alpha was calculated. For the analysis of the results of the collected data, the analysis method of the Average Ranking was used.

After analyzing the data collected during the research, it was possible to conclude that students use different electronic platforms in the current scenario for the teaching and learning processes. These platforms were already used by some students. However, with the scenario of COVID-19, there was an increase of 100% in the use of electronic platforms by students. This increase is a consequence of the absence of another way of student-teacher interaction and, access to learning materials in the University libraries.

It was also concluded that even with difficulties, students find alternatives to access the different platforms made available to them by the university, especially using WhatsApp. The main difficulty encountered by students is not related to the use of electronic platforms but to the costs of acquiring internet data packages, since more than 95% of students access instructional materials through cell phones. The students also report that the packages offered by the operators are characterized by being deficient for access to the different platforms as it is of short bandwidth. The study concluded that due to this set of difficulties, the use of electronic platforms does not help in the teaching and learning process, in the organization of their studies and does not improve or facilitate their learning in this context of the COVID-19 pandemic.

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