

# Analysis of students' perceptions of Google Classroom during the pandemic

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## ABSTRACT

The pandemic forced universities from the entire world to use different online platforms to carry out their activities. Learning activities using an online platform is not the same as face-to-face case and affected both categories. Teachers and students with different degrees of online platforms understanding had to adapt to online teaching and learning. This study takes a qualitative approach to analyze the students' perceptions as regards the use of Google Classroom in a Romanian university. The purpose of this research is to analyze in more detail the usefulness of Google Classroom and its potential for future use in universities after the pandemic. The results of this study revealed that from students' perspective the most important advantage is "ease of access" anytime, anywhere and from any device, and also the use of the Google Classroom platform must continue after the COVID-19 pandemic at least for some specific activities such as theoretical courses when the physical presence is not an issue.

## Keywords

Google Classroom, Online learning, pandemic, COVID-19.

## ACM Classification

D.2.2: Design tools and techniques. H5.2 User interfaces.

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## INTRODUCTION

The COVID-19 pandemic forced universities from the entire world to use different online platforms to carry out their activities [5]. More than 90% of the world's student population has been affected by school closures as a result of the COVID-19 pandemic [21]. Teachers and students with different degrees of online platforms understanding had to adapt to online teaching and learning. Engaging in teaching and learning activities by using an online platform is not the same as face-to-face [15] and affected both categories. In response to this threat, all educational systems and professionals are trying to act appropriately by finding effective solutions to minimize the adverse effects of the pandemic on the field of education [9, 13].

One of the most used platforms today is Google Classroom, a suite of tools that allows teachers and students to carry on their activities in an online environment. It is a mixed learning media facility that can make it easier for teachers

to set assignments, tests, and exams, to receive assignments submitted by students, to grade their activities, and so on [2]. Its original goal was to eliminate paper in classes and to create a digital learning environment. As more universities had to work in remote conditions using online learning platforms because of the COVID-19 pandemic, Google decided to allow free use of Google Classroom for anyone. This helped to widen the use of the Classroom platform around the world.

Google Classroom is the core component that tries to integrate into the same environment key components [19] like:

- Google Meet – for audio&video communication;
- JamBoard – for creating and sharing online whiteboards;
- Google Forms – for creating and using exam, test, and home works forms;
- Google Calendar – for activities' schedule and notifications;
- Google Drive – for storing every type of used materials (courses, seminars, labs, tests, home works, exam files, or forms);
- Gmail – for communication through email between teachers and students;
- Google Docs, Sheets, Slides, Sites – for online viewing and editing of the usual types of documents (text, presentation, sheets, pdf, etc.).

It is not easy for any student or teacher, without proper training, to understand how to do easy and efficient all the necessary activities using this set of components (that are not always perceived as a suit)

This study, by using a qualitative approach, tries to reveal how students perceived the entire set of activities during the learning process on the Google Classroom platform at the University of Craiova during the pandemic. Based on this situation and the presented analysis, we sought to identify which aspects should be considered at different levels to adapt online learning to the education context. The purpose of this research is to analyze in more detail the usefulness of Google Classroom and its potential for future use in universities after the pandemic.

## RELATED WORK

More than 110 articles that can be found today using "Google Classroom" keywords are indexed only in Web of Science that analyzes the use of the Google Classroom platform from different points of view using quantitative or

qualitative or mixed approaches. Starting with the first article indexed published in 2010, the interest in Google Classroom increased over time. Until today more than 70% of the indexed articles were published between 2018-2022. The large majority of them use a quantitative or a mixed approach and only 5 used a qualitative approach.

According to Bell [1], Google Classroom is a platform designed to help students and teachers to communicate, collaborate, organize and make paperless assignments. [16] shows that this platform's technology can be used as an effective tool in active learning by helping teachers to control their observations, surveys, and analyses of student demography. It provides easier access to teaching materials, additional learning resources, feedback, and more effective access for students in obtaining more information [3].

A study carried out by [7] within the domain of using Google Classroom as a self-directed learning tool in chosen courses found that the self-satisfaction of the students takes higher value when it comes to the usage of this platform due to its usefulness, ease to use, and its practicality in accomplishing the intended tasks.

Oktaria et al. [12] investigated the use of Google Classroom as a learning tool in Indonesia. They found that usefulness, ease of use, and ease of learning are the main factors influencing students' satisfaction. They identified several benefits that make Google Classroom an effective learning tool: simple access, available at any time and on any device, and the possibility to store learning materials,

In [11] were analyzed the advantages of online lectures as perceived by a sample of engineering students from a Romanian technical university in Bucharest and shown two categories of e-learning platform's benefits: educational and personal. In the first category were identified online participation and the possibility to record and review courses or seminars any time and from anywhere and in the second category were time-saving, comfort, and money-saving.

Although are some advantages of this e-learning platform like more flexibility and better time management, this methodology has limitations also. The loss of social relationships, access to resources, and digital literacy levels are only some of them. It is also known to use high-speed internet connection intensively, so a poor quality internet connection will create a severe disadvantage for some students or teachers, although Google has tried to fix it [20]. Other limitations were shown in [17], where the research highlighted that Google Classroom's communication process between students and teachers was not optimal, and not at the last in [18] where it's shown that Google tracks students' and teachers' activity for advertising purposes. All of that can lead to a different degree of acceptance, efficiency, comfort, or usefulness, to increase stress levels besides those already caused by coronavirus [4, 5, 6].

## METHOD

### Sample

A sample of 168 students from the University of Craiova - Faculty of Computer Science were asked to answer a dedicated questionnaire containing closed and open-ended questions. 13 of the received questionnaires have been

eliminated for incomplete data thus resulting in a working sample of 155 observations (110 male students and 45 female students).

### Variables

This study analyzed two open-ended questions:

*Q1. Please state and explain the main advantages of the Google Classroom platform.*

*Q2. Please give some examples where online classes make sense (are an advantage).*

The answers were not structured so a preprocessing stage was needed. Due to the variety of possible forms of expressions that can have the same meaning in Romanian and the unclear answers received from students, it was necessary to clean and filter the content of the recorded answers to select useful advantages reported by students. That was possible by using a synonym dictionary and analyzing the sense of each answer in each question context.

The next step was to create a keywords list for the cleaned and filtered answers to each question that highlights the useful advantages and convert them into binomial (dummy qualitative) variables. A set of 37 variables resulted from the open-end questions (19 variables for Q1 and 18 variables for Q2).

### Statistical analysis

Descriptive statistical analysis has been conducted. Because all the variables are binomial, we can only determine which is the most often reported advantage (the modal advantage). The first step was to identify advantages and then group advantages into categories

The students' answers usually contain more than one advantage so the next step was to identify the significant associations between any pair of advantages reported by students with the help of a chi-squared test [14].

Because there are many possible combinations of advantages, an analysis to extract advantages' association rules was necessary. The analysis was done using a machine learning apriori association rules algorithm [10] and especially written scripts in R language [8], version 4.1.2 with adequate packages library installed (arules, arulesViz, effect size).

The following indicators were determined for each rule: support (s), confidence (c) and lift (l).

## RESULTS

### Advantages of Google Classroom

Analyzing how many advantages students reported at the level of question Q1, we found that from the entire number of students, 90.32% did mention at least one advantage the largest percentage of students (73.55%) indicated between 1-3 advantages, and 70.32% of students highlighted at least two advantages of the Google Classroom platform.

The distribution of answers by the number of the advantages mentioned by students is presented in the next table:

Table 1. Distribution of answers by number of advantages

Advantages	Freq	%
0	15	9.68
1	31	20.00
2	45	29.03
3	38	24.52
4	14	9.03
5+	12	7.74
	<b>155</b>	<b>100.00</b>

The most important advantage (modal advantage) of the platform from students' perspective is the "Easy to access from anywhere" (14.89% of the entire number of advantages cumulative expressed by all students), followed by "Learning materials access" (14.61% from the entire number of advantages cumulative expressed by all students) and "Structure and workflow" (12.08% from the entire number of advantages cumulative expressed by all students). The resulting distribution of advantages is presented in Table 2.

Table 2. Distribution of advantages of Google Classroom

Category	Advantage	Frequency	%
Easy to access	From anywhere <sup>*)</sup>	53	14.89
	Anytime	31	8.71
	On any device	5	1.40
Easy to use	Easy to use	39	10.96
	Intuitive	6	1.69
Time	Time management	24	6.74
Efficiency	Fast	24	6.74
	Efficient	20	5.62
	Easy communication	19	5.34
Usefulness	Integrated calendar	3	0.84
	Automated notifications	5	1.40
	Learning materials access	52	14.61
	Learning materials easy storage	4	1.12
	Structure and workflow	43	12.08
	Usefulness	7	1.97
Comfort	Comfort	16	4.49
Other	Free	2	0.56
	Complete interface	1	0.28
	Secure	2	0.56
Total number of advantages reported by all students		356	100.00

<sup>\*)</sup> Modal advantage

Analyzing the advantages' categories distribution within students' answers we determine what is the importance which students give to any of them. It can be observed that the most important advantage of the Google Classroom platform from the students' perspectives is *Usefulness* (73.55% of students appreciate it), followed by *Ease of access* (57.42% of students appreciate it) and *Efficiency* (40.65% of students appreciate it).

Detected significant advantage associations using the Chi-squared test are presented in the next table.

Table 3. Significant association between advantages

Pair of advantages		$\chi^2$ statistic	p-value
From anywhere	Anytime	25.376	0.000
Time management	Comfort	8.618	0.003
Time management	Efficiency	8.505	0.004
Time management	Structure and workflow	4.716	0.030
Anytime	Learning materials access	4.704	0.030
Learning materials access	Structure and workflow	4.051	0.044

Six significant associations were found. The first two highlighted that from the students' perspective access anytime from anywhere on the Google Classroom platform and access at any time to learning materials are important as pair.

Three of the detected associations showed that time management is connected with efficiency and comfort in carrying out activities using the Google Classroom platform but also with the structure and workflow provided by Google Classroom. The last one involves the connection between the structure and the flow of activities provided by Google Classroom, respectively the ease of access to materials.

Table 4. Significant association between advantages' categories

Pair of Categories		$\chi^2$ statistic	p-value
Time	Comfort	10.893	0.001
Time	Efficiency	5.816	0.016

The same procedure was applied in the case of advantages categories and only two associations were detected that enforce the above conclusion. The findings are presented in Table 4.

Students perceive as connected the following categories of advantages: time-efficiency and time-comfort.

Deepening the analysis to detect association rules between any subset of advantages contained by the answers of Q1 we got that there are only four rules involving pairs of advantages that can be revealed (see next table).

Table 5. Rules of advantages associations

From	To	Supp.	Conf.	Lift
Anytime	From anywhere	0.148	0.742	2.170
From anywhere	Anytime	0.148	0.434	2.170
Anytime	Learning materials accessibility	0.103	0.516	1.538
Structure and workflow	Learning materials accessibility	0.129	0.465	1.386

From the detected set of association's rules, the most reliable rule is only the first one (74.20% confidence and lift>1) the access to the Google Classroom platform  $\{Anytime\} \Rightarrow \{From\_anywhere\}$ . The rest of them are not reliable because of the lower confidence values and/or lift near 1.

#### Online activities that make sense after the pandemic

Analyzing how many examples contain the students' answers for question Q2, we found that 56.77% of the students did not indicate any example of online activities having sense in the case of the Google Classroom platform

and the rest of them (43.23%) gave at least one example. The resulting distribution is presented in the next table.

Table 6. Distribution of answers to Q2 by number of examples

Examples	Frequency	%
0	88	56.77
1	37	23.87
2	27	17.42
3+	3	1.94
<b>Total</b>	<b>155</b>	<b>100.00</b>

Analyzing the distribution of the given examples in total examples reported by all students we found that 21.57% (modal value) highlighted examples where online activities make sense “when physical presence is not required for students or teachers”, 14.71% indicated “For computer programming classes”, 11.76% indicated “when you have a job” (see next table).

Table 7. Example of online activities making sense

Example	Frequency	%
When physical presence is not required for students or teachers*)	22	21.57
For computer programming classes	15	14.71
When you have a job	12	11.76
When it is difficult or impossible to reach physically (travel conditions)	10	9.80
Presentation of model applications (laboratories)	8	7.84
Theoretical courses	7	6.86
In times of pandemic	7	6.86
For all classes	5	4.90
For sharing materials	3	2.94
For course presentations (better than on a video projector)	3	2.94
When a classroom is not accessible	2	1.96
In case of poor health	2	1.96
When I don't have a computer I can enter from a mobile device	1	0.98
Clarification of doubts	1	0.98
For homework	1	0.98
For distance teacher-student communication	1	0.98
For presenting individual projects	1	0.98
For classes when working with many students	1	0.98
<b>Total</b>	<b>102</b>	<b>100.00</b>

\*) Modal example

In the case of question Q2, the association analysis revealed that there are no significant associations and therefore the detection of association rules was not performed.

**DISCUSSION**

The analysis of answers to question Q1 revealed that the majority of students preferred easy access from anywhere on Google Classroom, easy access to learning materials, and also appreciate the structure and the workflow provided by Google Classroom, which is in line with the findings of Tenda et al. in [17] and Oktaria et al. in [12].

Usefulness and Ease of access are the most important advantages categories from the student's perspective. Within the case of the first one, the modal advantage determined was Learning materials access and in the case of the second one the modal advantage detected was

accessing From anywhere. There are many examples of answers that support this conclusion: "resources accessible anytime, anywhere", "access to learning materials anytime, anywhere", "easy access to materials, there is no longer the constraint of being in a certain place", "we have access to materials anytime; online lessons are an advantage because we can access them from different locations."

Students perceived the main advantages of Google Classroom as being associated with each other. The significant associations identified were: access to the platform from anywhere at any time, access to learning materials, the way they manage time due to the comfort and efficiency of use, and the structure and workflow provided by the platform.

The analysis of the association rules revealed the existence of only one significant rule, namely access to the platform from anywhere at any time. We concluded that this was because the students access the platform on a large variety of devices and they prefer not having place or time restrictions for access. A similar conclusion was drawn by Dash [3].

The analysis revealed examples where online classes make sense: When physical presence is not required for students or teachers. In other words, students highlighted that the use of an online platform has at least one advantage and this must be kept even after the end of the COVID-19 pandemic.

**CONCLUSIONS**

This analysis showed that the most important advantage is “ease of access”, which has two main components: access to the online course and access to resources (teaching materials, courses, seminars, videos, presentations, etc.). There is also a second level of interest for students that details the attributes related to access: anytime, anywhere, from any device.

The findings suggest that the Google Classroom platform use must continue after the COVID-19 pandemic at least for some specific activities such as theoretical courses when the physical presence is not an issue.

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