

# Google Classroom Learning Cloud Environment in the Modern Information and Digital Society

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## Abstract

The purpose of the article is to analyse the Google Classroom learning cloud environment, to identify its advantages and disadvantages in the modern information and digital society, as well as to achieve this goal, the methods of analysis, synthesis, deduction, and induction were used, and also a survey that allowed to evaluate and to establish the advantages and disadvantages of using Google Classroom in the educational process was conducted. The results focus on the peculiarities of this learning platform the functioning and practical assessments of its potential. The author emphasises the peculiarities of organising video meetings, creating and editing training courses, publishing announcements, grades, and establishing feedback from teachers. Google Classroom boasts significant features, such as seamless integration with other company services, a robust security policy, and widespread accessibility across iOS and Android devices. Nonetheless, the realm of digital learning technologies is continuously evolving at a rapid pace. Consequently, it is only a matter of time before the next advancement in cloud-based learning environments emerges. According to survey findings, Google Classroom's ability to personalize students' educational paths is rated relatively modestly. As a result, future improvements in this aspect are likely to be necessary to enhance its efficacy further.

**Keywords:** Google Classroom, cloud environment, digital technologies, E-learning

## 1. Introduction

The development of digitalisation has affected all aspects of modern social life. Particularly, the global COVID-19 pandemic has become an important stage in the development of digital technologies. The quarantine restrictions associated with it have led to the intensification of distance learning. In turn, distance learning has affected the involvement of digital technologies in teaching and the educational process in general (Sönmez, 2021). In practice, it turned out that distance learning was not inferior to traditional learning, but the effectiveness of its complete dominance in the market of pedagogical services still raises some concerns.

The emergence and development of smartphones and other mobile devices has led to the emergence of the concept of mobile learning - m-learning. Today, this concept is being actively transformed into ubiquitous learning, which is seen as a continuous process of self-improvement using a variety of information devices, from a computer to a smartphone or tablet, with Internet access anywhere in the world. Therefore, modern requirements for the quality of higher education require the creation of an optimal learning environment where the interaction between the teacher and the student will be effective. To do this, it is necessary to create an environment that will allow controlling, coordinating, and combining various sources of information. Moreover, it could increase the efficiency of the knowledge assessment process, as well as personalise the process of acquiring knowledge, make it more flexible and efficient. Such an environment will make it easier for students to absorb information at their own pace, which, in turn, will ensure a more effective application of the knowledge gained in practice.

Nevertheless, the use of the distance innovation model is not without obvious drawbacks. Some distance learning tools have also been criticised. It is about vulnerability and security challenges, which in the times of the information society and hybrid threats are of particular importance and require the use of new mechanisms to counteract. Therefore, the relevance of studying the tools for organising innovative distance education against the background of globalisation and internationalisation is quite high, especially if taking into account the possibilities of information manipulation and the capabilities of cybercrime structures.

The integration of technology in education has significantly transformed the traditional classroom environment, and Google Classroom, as a prominent player in this transformation, has raised several critical questions and challenges within the context of the modern information and digital society. The research problem for the topic of the article can include balancing technological advancement with educational efficacy. As digital technology, particularly cloud-based platforms like Google Classroom, continues to proliferate in educational settings, there is a pressing need to investigate the delicate balance between technological advancement and educational effectiveness.

The concept of a “learning cloud environment” encapsulates the fundamental shift in educational paradigms. It signifies a departure from the confines of physical classrooms to a realm where learning is not bound by time or location. In this environment, learners and educators alike can engage in a collaborative and digitally-enhanced educational experience. Google Classroom, as a leading player in this transformation, exemplifies the potential of technology to empower learners, streamline administrative tasks for educators, and foster a sense of community within the virtual classroom. This exploration delves into the multifaceted facets of Google Classroom's role in the modern information and digital society. We will examine how this innovative platform has redefined the educational landscape, offering a more inclusive and accessible approach to learning. From its inception to its ongoing evolution, Google Classroom continues to shape the way we acquire knowledge, emphasizing the importance of adaptability, connectivity, and digital fluency in the 21st century.

Researchers have constantly addressed the issue of using Google Classroom and digital technologies namely in education. Particularly, Clark-Wilson, Robutti & Thomas (2020) identified the prospects for the use of distance technologies in the future, traced the problems existing today and promoting the need to be addressed. Similarly, Mehlenbacher & Mehlenbacher (2020) drew attention to the prospects of distance learning. Liubarets et al. (2022) described the peculiarities of the formation of relevant competencies through the prism of modern digitalisation changes. Semenets-Orlova et al. (2021) characterized the features of using emotional intelligence as a basis for leadership development. Semenets-Orlova et al. (2020) determined the peculiarities of the allocation of roles in a modern educational institution. Ha (2020) analysed the elements of integration of various online learning environments, including Google Classroom and Google Meet, based on Korean experience. Hart-Davis (2018) also identified the benefits of using the platform under study, but his work was created before the global pandemic, so some of the researchers' comments need to be interpreted with caution due to the spread of distance learning in 2020. Jarvis (2023) and Liubarets et al. (2022) devoted their articles to the problem of acquiring the necessary digital competencies. Santos (2021) identified the advantages of Google Classroom when used as a supplement to the traditional form of education, combined his findings with the possibility of an exclusive functioning of the educational process based on distance learning. Important conclusions are made by Svensson, Pendrill & Pelger (2020), and Thomas (2021), who have investigated the capabilities of the Google Classroom cloud environment, its strengths, and weaknesses when used in a long time practice. Bakhmat & Smorgun (2022) investigated the main conditions for the formation of future education through the prism of modern digitalisation processes. A similar issue was studied by Bondar et al. (2020). These researchers outlined the key aspects of the use of information and communication technologies in the higher education system. Gumenyuk et al. (2021) described the main transformational opportunities of vocational education based on the consideration of digitalization changes.

In the modern information and digital society, the Google Classroom learning cloud environment plays a significant role in facilitating remote education and enhancing the learning experience. While it offers valuable features, including integration capabilities, security measures, and multi-device accessibility, the dynamic nature of digital learning technologies presents challenges. The current state of the platform raises concerns about its effectiveness in personalizing the educational trajectory of students, as it is perceived to be only moderately satisfactory. Addressing this limitation and improving the platform's ability to cater to individual learning needs is essential to maximize its impact and relevance in the evolving landscape of education.

The purpose of the article is to analyse the Google Classroom learning and cloud environment, to identify its advantages and disadvantages in the modern information and digital society. To accomplish this main task, the article will be divided into several smaller sub-paragraphs. One of them will focus on the potential risks of using the platform

for educational purposes. The other will focus on the undeniable advantages of this educational environment, which explains its popularity in use among many educators.

## 2. Method

### 2.1 Research Design

This study was conducted in several stages: theoretical and empirical. At the first stage (theoretical), the basic principles of the Google Classroom platform were determined; the theoretical foundations of using Google Classroom through the prism of the formation of an electronic educational environment were characterised. The second stage involved an experimental test of the features of using Google Classroom in teachers' professional activities. Particularly, a research experiment was organised to identify key issues and prospects for further use of this platform. The third stage of the study summarised the results and obtained data as well as outlined further prospects for using Google Classroom as a means of forming an electronic educational environment.

### 2.2 Participants

To solve the main task of identifying the problems and prospects of using Google Classroom, a pilot survey of teachers and students of Ukrainian educational institutions was organised. The sample included 205 students and 170 teachers. All teachers were of different ages and, accordingly, had different pedagogical experience in using digital learning platforms. Before completing the anonymous survey, all potential respondents gave their personal consent to participate in the study and to have their answers processed. The participation of students and teachers in the experiment was anonymous, free of charge, and based on the right to choose to participate in the survey or not.

### 2.3 Instruments and Data Collection

In order to study the peculiarities of Google Classroom platform use as a special means of forming an electronic educational environment, a special survey of teachers and students was conducted on the basis of Google-forms. The obtained information was processed using Excel and Statistika programs. In general, the data for the study was collected from 06.09.2022 to 20.01.2023, that is, during the first semester of the 2022-2023 academic years. In order to determine the effectiveness of using the Google Classroom platform as a means of forming an electronic educational environment, closed and open surveys were developed. They concerned the frequency of use of the studied tool, its effectiveness, identification of strengths and weaknesses, the role of the platform in the organisation of e-learning, etc.

#### 2.3.1 Teachers were asked to answer the following questions:

- 1 How often do you use the Google Classroom platform in your courses?
- 2 How would you rate the usability of Google Classroom?
- 3 Which Google Classroom features do you use most often?
- 4 Has your approach to teaching changed with Google Classroom?
- 5 Has your interaction with students improved since using Google Classroom?
6. How would you rate your digital proficiency with this platform?

#### 2.3.2 The following questions were formulated for students:

- 1 How often do you use Google Classroom for learning?
- 2 How would you rate the usability of Google Classroom?
- 3 Which Google Classroom features do you use most often?
- 4 Has your learning approach changed with Google Classroom?
- 5 Has the use of Google Classroom made it easier to receive materials and assignments from teachers?

#### 2.3.3 For both groups:

- 1 What advantages do you see in using Google Classroom?
2. What are the disadvantages of using the platform?
3. How would you rate your overall experience of using Google Classroom?
4. Would you recommend using Google Classroom in the future?

## 2.4 Analysis of Data

The research is based on two types of methods use: general scientific (logical) and pedagogical. General scientific methods, such as analysis, synthesis, induction, and deduction, are important for expanding knowledge about the research subject. For example, by analysing the subject of research, it can be broken into smaller parts: to identify the main problems and describe the phenomenon of distance learning, and determine its functioning role of digital tools. The synthesis helps to combine the previously identified problems and to formulate the own judgments. In the process of applying induction and deduction, the obtained data were generalised on the basis of logical reasoning from the specific to the general. In addition, structural, functional, and systemic methods were used. The application of the systemic method allowed considering the distance education as a complex and constantly evolving system. This method also made it possible to determine the possibilities of Google Classroom in the formation of knowledge and competencies among students.

Theoretical pedagogical methods included the comparison, classification, and generalisation. As a method of pedagogical research, the technology of comparison involves a thorough comparison of certain results. In this article, comparativism was in order to compare the strengths and weaknesses of using Google Classroom and as well as to identify opportunities improving its integration into the educational process. On the basis of generalisation, a transition was made from the specific obtained results concerning the formation of general conclusions about the problem of integrating the above-mentioned information and learning environment into the educational process.

Other theoretical pedagogical research methods were also used in the study, including abstraction and concretisation. These methods allowed covering the problem for diverse approaches. The method of system analysis was used in order to highlight the functionality of the Google Classroom tools.

## 2.5 Ethical Criteria

The pilot survey was conducted through the prism of respect for students and teachers, identifying any considerations regarding the use of the Google Classroom platform in the process of providing educational services. The process of involvement in the survey was based on the voluntary consent of potential participants. The survey does not contain any signs of discrimination based on age or gender. All the above-mentioned stages of the study comply with the generally accepted principles of research academic ethics.

## 2.6 Theoretical Framework

### 2.6.1 Google Classroom: Features of Formation and Use

The modern requirements of the information and digital society are based on a flexible learning approach, an active exchange of ideas and experience, a personalisation of courses depending on the tasks and competencies of students, an efficient use of existing educational content, and an easy management for educational institutions. In other words, smart education, or smart education, is a flexible educational system in an interactive learning environment using content from around the world that is accessible to all. The main principle of smart education is the knowledge accessibility.

The key advantages of smart education include flexibility, personalised approach, and availability of various sources of educational content and conditions for learning activities, as well as the use of the latest pedagogical technologies.

Therefore, modernity requires teachers to organise distance learning in order to provide students with the bulk of the educational material, active interaction with teachers during training, to provide opportunities for independent work with the assimilation of educational material, assessment of knowledge and professional skills (Ramsaroop, Batchelor & Petersen, 2022). This raises the problem of finding and selecting affordable and easy-to-use information and communication technologies for distance learning that will ensure the creation, transfer, and storage of educational materials, active communication, and support of the educational process in educational institutions (la Velle, Newman, Montgomery & Hyatt, 2020). One of the most popular tools and learning cloud environment is Google Classroom.

Google Classroom is a part of the Google Apps for Education (GAPE) suite, which consists of online tools that enhance learning and collaboration between teachers and students. GAPE includes many of Google's most popular programs, such as Gmail, Google Calendar, and Google Drive, which are available to all users. In 2014, Google introduced Google Classroom, which provides a user-friendly interface for creating and managing training courses. This educational platform is easy to use and provides users with a user-friendly interface for managing the learning process (Hart-Davis, 2018).

However, Google Classroom is an exclusive program for educational institutions that can be downloaded for free. This program is a centralised platform for teachers to communicate with students, provide feedback, and assign homework.

One of its main advantages is convenience and organisation, which saves time. Google Classroom is a learning management system (LMS) offered by Google for teachers to communicate, ask questions, and complete assignments (Santos, 2021). It helps to facilitate the online learning process in the context of distance education in the modern digital world. The program has a unique look and feel, and teachers can uniquely organise their classes according to their teaching methods, as it starts as a blank canvas. In order to add students to Google Classroom, teachers must first create an online classroom for their physical classes. However, Google Classroom can also be used for distance learning and large learning events without the physical presence of students. Instructors have access to additional options that are not visible to other participants in the learning process, such as adding them to the class, creating announcements and assignments, and downloading material from their view (Thomas, 2021).

According to current research on the platform by Santos (2021); Svensson et al. (2020); Thomas (2021), Google Classroom combines various services and tools from Google, which allows them being used to prepare the educational content. For example, Google Drive for storing files and documents, Google Docs for creating documents, spreadsheets, presentations, drawings, etc., Google Forms for creating tests and questionnaires, and YouTube for storing and adding videos.

### 3. Results

The experiment revealed that 14 teachers (12%) do not use this platform at all. 63 respondents (36%) assumed that they actively and constantly use Google Classroom in their professional activities. 87 people (52%) said that they use this tool occasionally. The survey found that 73% of teachers consider it necessary to use this platform in their teaching work. The majority of respondents (teachers - 78% and students - 61%) emphasised the convenience of using this tool in the e-learning model. Teachers use this platform mainly for the effective organisation of digital work, including video meetings, creating courses, assignments, publishing announcements, and polls, keeping a journal, archiving the class, posting additional materials, etc. Students noted that the most important functions of the platform for them are completing assignments, receiving feedback from the teacher, including receiving comments and grades and sharing educational information (See Table 1).

**Table 1.** Google Classroom Features That Are Most Often Used by Teachers and Students

Features	Quantity
Teachers	
Organisation of video meetings	45%
Creating courses	95%
Creating special tasks	93%
Publishing announcements	65%
Publication of polls	42%
Keeping a journal, setting grades	95%
Placement of educational materials	82%
Applicants for education	
Completion of tasks	71%
Receiving educational materials, and constant access to them	87%
Receiving grades and comments from the teacher	67%
Exchange of information, receiving feedback	62%

Source: author's development

It should be noted that teachers have the possibility to create different classes in Google Classroom and give students access to materials such as text documents, presentations, videos, and audio recordings. They can also create various tasks, such as tests and questions, which are very convenient to use for learning and checking grammar and vocabulary material. All this information is stored on the teacher's Google Drive. Students, in turn, have round-the-clock access to teaching and learning materials, which is provided immediately after publication or according to the schedule of classes. Google Classroom also allows teachers and students to interact by sending personal messages (Sarosa et al.,

2022). Teachers can rate and comment on assignments and return them for revision. This feature encourages learners to improve their knowledge and performance. In addition, this feature is often used when checking essays on various topics.

The Google Classroom platform supports the organisation of various types of assignments. For example, teachers can attach specific files to an assignment that students can simply view, copy, or edit. After completing an assignment, they have the option to create a specific file and attach it to the assignment. At the same time, each participant in the educational process has the opportunity to track the progress of the task. Completed assignments can be evaluated by teachers and returned with comments. This, in turn, allows the learner to review the assignment and correct mistakes.

Another important feature of the platform is the special archiving of courses at the end of the semester or year (Svensson et al., 2020). When a course is archived, it is removed from the homepage and moved to a special section called “Archived Classes”. This helps teachers to efficiently organise their next classes. When a course is archived, they can view it, but they cannot make any changes until it is not updated. An important tool of the platform is a separate section “Grades”, which is available only to teachers. Using this tool, teachers can study and modify current gradebook data, as well as check students' assignments. The classroom can only be accessed from a computer. However, there are special Google Classroom mobile applications that appeared in January 2015. They are available for any iOS and Android devices.

It should be noted that students emphasised that the use of Google Classroom make it easier to receive materials and assignments from teachers (64%). When asked whether the learning approach has changed with Google Classroom, most respondents emphasised that they, as participants in the e-learning environment, felt comfortable with this platform and found it easy to use. Teachers mostly emphasised the convenience of keeping a gradebook and the process of course archiving. Respondents also accentuated that their digital interaction and communication had improved as a result of using the platform (teachers - 87%, students - 72%). Participants in the experiment were also asked to assess their digital literacy based on their use of the Google Classroom platform. Despite the fact that most participants emphasised the ease of use of this tool, 43% of teachers underlined their desire to improve their digital literacy and improve their skills in using Google Classroom. Other researchers have also highlighted the importance of developing teachers' digital literacy (Bakhmat et al., 2022).

Among the advantages of the platform, respondents most often underlined its free-of-charge nature, the accessibility of the platform, the user-friendly interface, the absence of advertising during the organisation of the educational process, the ability to effectively transfer tasks, and the ability to create tests. Among the disadvantages, respondents mentioned the difficulty of maintaining a gradebook, the inability to differentiate the learning strategy of students based on the results of the tasks, and the presence of restrictions on the number of participants (See TABLE 2).

**Table 2.** Matrix of Disadvantages and Advantages (based on the platform functionality mentioned in the respondents' answers)

Functionality	Teachers	Applicants for education
Easy course setup	+/-	+
Free and accessible	+	+
Simple interface	+	+/-
The need to train teachers or students to work with the platform	+	+
Availability of advertising during work	-	-
Unlimited number of participants	-	-
Availability of a journal with grades	+/-	+
Ability to differentiate the learning strategy of students based on the results of the tasks	-	-
Ability to transfer, download files	+	+
Ability to create test tasks	+	+
Availability of news feed	+	+

Source: author's development

Therefore, the use of the Google Classroom cloud-based educational environment has its advantages and disadvantages, as noted in the study. By comparing the results and the general opinion on the effectiveness of this platform, it is possible to identify opportunities for its use.

#### 4. Discussion

The effectiveness of modern digital learning platforms as a means of forming a single e-learning environment is confirmed by a number of modern scholars (Hitchcock, Sage, & Smyth, 2019; Haliuk, 2022; Bondar et al., 2021; Ali, 2022). At the same time, modern research notes a certain list of advantages of Google Classroom (Hart-Davis, 2018; Santos, 2021; Sarosa et al., 2022; Svensson et al., 2020). Among them are:

1. Easy setup and convenient use. A teacher can organize several courses at the same time, plan the learning process, and invite other teachers to work with them. This is possible through the use of announcements, assignments, questions, and other educational materials from other courses. In addition, the service allows you to organise collaborative teaching, where each teacher can involve up to 20 colleagues in the course. Teachers can create teaching materials and announcements for a group of students, as well as for each individual student, using a large number of templates for tasks (Santos, 2021). The functionality also includes the ability to group participants in the learning process by name or surname, which allows tracking their work, give preliminary grades, and add comments or annotations in the mobile version of the service (Hart-Davis, 2018). It is also possible to distribute among the participants of the learning process the rights to post notes and comments in the course feed, as well as to export the grades to Google Sheets or a CSV file. A particularly important feature is the presence of a logbook for control, the ability to create tests and share materials with other class members (See TABLE 3)

**Table 3.** Main features of Google Classroom

Google Classroom	
The resource is free of charge	Yes
Availability (registration)	Only possible via Gmail
Intuitive and simple interface	Yes
Interface language	Any (some other platforms - English only)
Ability to conduct video meetings	Yes Based on Google Meet
Ways to add to the class	Only if applicants have a Google account
Restrictions on the number of participants	Up to 200 people
Availability of a control log	Yes Integrated with learning tasks
Availability of applications on IOS, Android platforms	Yes
The work organisation in separate small groups	Only possible through access to individual files on Google Drive
System uploading of training files	Yes
Unlimited available capacity of the global device for storing training files	No Up to 15 gigabytes
Ability to create tests	Yes Based on Google Forms
Text formatting in the task	No
The presence of a news feed in which the teacher writes messages to students	Yes
Integration with various Google services	Yes

Source: author's development

These opportunities generally coincide with the assessments of teachers who have actually used Google Classroom in practice. Some difficulties were also noted, as not all age groups of teachers find this service easy and understandable

2. User-friendly interface: students can view assignments, plan their deadlines, and submit completed work for review on time. Other researchers emphasise the convenience of the interface (Santos, 2021; Sarosa et al., 2022; Svensson et

al., 2020; Thomas, 2021). Particularly, the convenience of the service lies in the fact that they can join the course themselves using a short course code that is automatically generated when creating a course. The code is displayed on the front page of the course, or the instructor can send it to the students. This is a very convenient way to join a course and create a study group (Svensson et al., 2020). Other features are also relevant: tracking assignments and course materials, communicating and exchanging information with the instructor or with other students through the course feed, email, etc., submitting completed assignments using the appropriate button, receiving grades and comments from the instructor, filtering assignments by criteria such as “Assigned”, “Returned with grade”, and “Missed deadline”, etc. These comments are supported by the scientific literature (Santos, 2021; Sarosa et al., 2022; Svensson et al., 2020; Thomas, 2021) and confirmed in the study.

3. Saves time and paper: the service allows you to monitor and check assignments. Google Classroom is designed in such a way that it allows teachers to save time. For example, the assignment setup feature allows you to set deadlines for submitting assignments, edit the grading scale and track already checked assignments, and schedule assignments for a specific date and time using the built-in Google Calendar. In addition, instructors can create “drafts” of teaching materials for the course and set the date and time they appear in the course feed (Sarosa et al., 2022). Teachers also have the opportunity to create surveys for students using the “Questions” option and view the answers in Classroom. It is possible to change the theme and design using the “Theme” option (Thomas, 2021). The teacher has the ability to automatically sort tasks into checked and unchecked. The teacher can check materials, such as assignments, comments, questions, etc. In addition, the teacher has the ability to comment and edit work in real-time.

The convenience and comfort of online work in Google Classroom is confirmed in the survey. Among the disadvantages, students and teachers emphasised the lack of opportunities to individualise the learning path.

4. Accessibility and security. The security of the Google Classroom service is ensured by the absence of advertising materials within the platform and the company's promise not to use users' personal data for advertising and marketing purposes. This factor is very important for ensuring user privacy (Santos, 2021). In addition, the processing of personal data in the Google Classroom environment takes place in accordance with the G Suite Agreement, which complies with the Family Educational Rights and Privacy Act, adopted in the United States in 1974. Even teachers have the option of inviting parents and legal guardians to subscribe to a mailing list to receive information about students' assignment arrears, but this is more relevant for school institutions than for higher education institutions (Thomas, 2021). In addition, a significant advantage is that Google Classroom is free for educational institutions, non-profit organisations, and individuals, and provides a 24/7 free support service.

Overall accessibility and security have been confirmed by a survey. Integration with Gmail requires mandatory registration, but these corporate rules are acceptable to users.

## 5. Conclusions

Thus, the Google Classroom cloud-based learning environment is a reliable tool for distance learning. Modern teachers and students are actively using the Google Classroom platform in attempts to organise an electronic learning environment.

As the results of the study demonstrate, Google Classroom is a convenient tool for creating a smart educational space, as it has all the important functionality needed to implement e-learning in full. The platform has a number of advantages: accessibility, free of charge, simple interface, integration with other Google services, regular updating of educational materials, etc. However, an important problem is the ability to use the full functionality of the Google Classroom platform. This issue can be resolved by organising special training seminars for the teaching staff of educational institutions or by means of self-study by teachers using modern information and digital technologies.

Important features of Google Classroom include integration capabilities with other company services, security policy, and accessibility on various iOS and Android devices. At the same time, the development of digital learning technologies is extremely dynamic. Thus, the next evolution of the cloud-based learning environment under study is only a matter of time. As the survey has shown, the capabilities of Google Classroom to individualise the educational trajectory of students are assessed rather mediocly, so this aspect will probably need to be improved in the future.

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