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Proposals for improvement of Google Classroom and MyTestX platforms in distance teaching of exact disciplines

MYKOLA MORMUL, DMYTRO SHCHYTOV, OLEKSANDR SHCHYTOV, LYUBOV ROMANCHUK. **Proposals for improvement of Google Classroom and MyTestX platforms in distance teaching of exact disciplines.** *The article compares two widely-used online learning platforms, Google Classroom and MyTestX, focusing on their application in teaching exact sciences such as mathematics, physics, chemistry and others. It examines the main features, advantages, and drawbacks of each platform. Special attention is given to how well they support the integration of visual elements like formulas, graphs, and diagrams, as well as the ease of creating and conducting tests and exams. The article also provides recommendations to enhance the use of Google Classroom for teaching exact disciplines*

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remotely, addressing modern needs for interactivity and technological support in education. It highlights specific ways to improve distance learning in mathematics and other exact sciences on these platforms.

Keywords: *platforms MyTestX, Google Classroom, Skype, chat sessions, exact disciplines, distance learning.*

1. Introduction

Modern technologies are significantly changing approaches to learning, and distance education has become an important component of the educational process. In the context of the rapid development of digital platforms, in particular for teaching exact disciplines, choosing the right tool is becoming a key factor for effective learning. Platforms such as Google Classroom and MyTestX provide ample opportunities for organizing online classes, creating tests, checking tasks, and interacting between teachers and students.

Of particular importance is the problem of adapting these platforms to the specific needs of exact disciplines, such as mathematics, physics, chemistry, where it is necessary to use complex graphic elements, formulas, diagrams, and other specific symbols. However, in practice, both platforms have their own advantages and limitations that may affect the convenience and effectiveness of teaching these disciplines.

Objective. The aim of the article is to conduct a comparative analysis of the Google Classroom and MyTestX platforms in the context of their use for distance teaching of exact disciplines, as well as to consider the main functions, capabilities and disadvantages of each of them. To achieve this goal, the following tasks should be solved:

1. To analyze the functionality of the Google Classroom and MyTestX platforms for teaching exact disciplines, in particular, to study their interface, available tools for creating and conducting online classes, as well as organizing tests and checking tasks.
2. To assess the ease of use of graphic elements, such as formulas, graphs, diagrams and other specialized symbols, on both platforms, as well as to identify possible difficulties that may arise when integrating them into the educational process.
3. To compare tools for creating tests and assessments on each platform, in particular, to consider the possibilities for automatically checking answers, providing feedback to students and statistical analysis of results.

4. Identify limitations and shortcomings of both platforms that may negatively affect the process of teaching exact disciplines, in particular in the aspects of the lack of support for specific mathematical symbols, restrictions on the number of downloadable materials, or problems with image quality.
5. Develop recommendations for improving the platforms, in particular regarding functional updates or integrations that would allow more effectively organizing teaching of exact disciplines in a distance format.

Research methods. To achieve the goal and solve the identified tasks, the following methods were used.

1. Comparative analysis of the functionality of the Google Classroom and MyTestX platforms, in particular their tools for creating and conducting classes, testing, checking tasks, using graphic elements, formulas, diagrams, and other mathematical symbols. This method allows you to determine which of the platforms is more convenient for teaching exact disciplines.

2. Content analysis for the analysis of materials placed on distance platforms (task texts, tests, graphic elements), in order to determine the specifics of their use in the context of exact sciences, as well as to assess their suitability for integration into the educational process.

3. Method of comparing theoretical and practical aspects for comparing the theoretical foundations of distance learning in exact disciplines with the practical experience of teachers and students, which allowed to formulate specific recommendations for improving existing platforms.

2. Practical experience

Analysis of the latest trends [1], O. Andreev, V. Bykov, Y. Bogachkov, M. Burda [3], D. Vasilyeva [4], V. Glazova [5], T. Godovanyuk [6], D. Ivanchenko, V. Kukharenko, V. Lapinsky, N. Morze, M. Mormul, O. and D. Shchytyovy [10], E. Polat, E. Smirnova-Trybulska, P. Stefanenko, A. Khutorsky and others.

Most authors focus on the advantages and disadvantages of distance learning forms [1], [5], determining general trends in their development and their relationship with international practices of distance education [2], [8], [13], [14], the history of the emergence of this concept [7], [8], the specifics of the organization of distance learning in individual disciplines [7, c. 23-27], as well as the shortcomings of distance learning in higher educational institutions of Ukraine [7, c. 37-30].

However, in our opinion, there is still a lack of research that examines in detail the specifics of distance learning in exact disciplines. General information about the distance learning course in mathematics methodology was provided by T. Godovanyuk [6]. And the features of such training during the war in Ukraine were analyzed by M. Burda and D. Vasilyeva [3], [4], V. Glazova and K. Vesela [5], as well as the authors of this article [10], [11], [12]. However, we did not find specific proposals for improving and improving forms of distance learning in mathematics and other related fields, except for our own recommendations set out in articles [10], [11], [12] and [15], which emphasizes the relevance of this topic. There is also a lack of research that concerns the specifics of distance learning in higher educational institutions of Ukraine under martial law.

3. Presentation of the main material

Distance learning (or online learning) is a form of education in which most or all of the course is provided to students using modern technologies and in an interactive format, which allows teachers and students to be in different countries or even on different continents. However, this format is not suitable for all disciplines. In particular, it is not suitable for subjects where practical activity plays an important role, such as medicine, veterinary medicine, architecture, metallurgy, chemistry, artistic creativity, etc. The advantages and disadvantages of this form of education have been noted by many researchers [1, c. 8-9], [2, c. 10-11], [15, c. 76-77]. Therefore, there is no point in repeating it.

A number of platforms have been created for distance learning (chat classes and web classes), each of which has its own characteristics (Table 1).

Table 1
Platforms for distance learning

No	Name	Description
1	Skype	Allows text, voice and video communications over the Internet, using peer-to-peer networks.
2	Zoom	A video conferencing service that allows you to connect up to 100 devices simultaneously with a 40-minute limit for free accounts (the limit was lifted during the war).
3	Google Meet	A platform for secure video conferencing, where up to 500 participants can participate, as well as broadcast to up to 100,000 viewers.
4	Moodle	A free learning management platform that allows you to create virtual environments and configure various functions.

5	Ilias	A free platform for creating forums and blogs, popular in universities, particularly in Germany, which supports the SCORM standard.
6	Spring Learn	An online testing and webinar platform used for distance learning of employees.
7	WebTutor	A talent management system that includes tools for recruiting, training and assessing competencies.
8	Teachbase	A platform for creating courses and tests, as well as conducting webinars.
9	Spring Market	Software for creating and selling online courses.
10	Memberlux	A service for creating courses based on WordPress.
11	Microsoft Teams	An enterprise platform for chat, meetings, notes, and collaboration.
12	EdApp	A virtual classroom that is compatible with Zoom and Microsoft Teams.
13	Google Classroom	A free service for creating, distributing, and grading assignments in a paperless manner, as well as for remote testing and exams.
14	MyTestX	This is a system for creating and conducting computer-based tests that allows you to collect and analyze results, as well as assign grades according to the scale specified in the test.

Source: websites of the mentioned platforms.

Ukrainian educational institutions usually use the platforms Skype, Moodle, Zoom based on Google Classroom, Google Meet and MyTestX. The most popular are MyTestX and Google Classroom. However, they have different goals, functionality and approaches to organizing learning. A comparative analysis of these two tools will help to understand their features, advantages and disadvantages. First, we will note their general differences, and then, using our own experience of working on these platforms, we will highlight their disadvantages (Table 2).

Table 2
Features of the MyTestX and Google Classroom platforms

Platforms Features	MyTestX	Google Classroom
Main goal and purpose	This platform is designed to automate knowledge testing processes, allowing teachers to quickly create tests, analyze results, and receive feedback.	This comprehensive learning management platform allows teachers to create courses, distribute assignments, communicate with students, and store learning materials. Google Classroom is focused on the full cycle of learning and course management.

Functionality	1. Create various types of tests (multiple choice, fill-in-the-blank questions, table-based answers, etc.). 2. Automatic test checking. 3. Generate reports and analytics based on test results. 4. Evaluate results using algorithms. 5. Ability to integrate with other platforms or systems for data exchange.	1. Creation, distribution, and grading of assignments. 2. Ability to add a variety of learning materials (videos, documents, links). 3. Integration with other Google products (Google Docs, Google Drive, Google Meet). 4. Collaboration on documents and projects. 5. Tools for communication between students and teachers (chats, comments).
Approach to evaluation	1. Focused on automated assessment through tests and surveys. 2. Tests can be pre-configured for automatic checking of answers, which allows for quick feedback. 3. May include functionality for creating personalized tests or adaptive tasks.	1. Grading in Google Classroom is done manually by calculating points for each assignment. 2. Students can receive feedback from teachers in the form of comments or specific grades. 3. Lack of automatic test checking function (although it can be implemented through integration with other tools).
Interface and accessibility	1. The interface is focused on creating tests and analyzing results. 2. It may be less intuitive for users who are not familiar with the platform. 3. May require some training to fully utilize the functionality. 4. Web-based interface with access from any device.	1. The interface is very user-friendly and intuitive, especially for those who already use other Google products. 2. Available via a web browser and mobile applications (Android and iOS). 3. Easy for users of different levels of technical training.
Integration with other tools	1. May have limited integrations, mainly with other testing platforms or learning management systems (LMS). 2. Depending on the platform version, integrations with other tools may be limited or require additional configuration.	1. Widely integrated with other Google products (Google Drive, Google Docs, Google Meet, Google Calendar), which allows you to create a dynamic and convenient learning environment. 2. Easily integrates with other external tools and platforms, such as Turnitin, Kahoot!, Edpuzzle and others.

Security and privacy	May have some security requirements, including protecting test data and results. However, security depends on the specific implementation and policies of the platforms.	Offers a high level of security thanks to integration with Google, which provides reliable data protection across Google services. Uses Google's security infrastructure, which includes two-step authentication and regular security updates.
Pricing policy	May offer paid plans with varying levels of functionality, including advanced test customization, report generation, and analysis.	Free for all users, but has limitations on the number of users and capabilities for business versions that require a subscription to Google Workspace for Education.
Support and resources	Support may be limited or dependent on the subscription level. This usually includes documentation and online support.	Has a large knowledge base and support from Google, as well as lots of online resources and training videos.

Source: websites of the mentioned platforms.

But there is a difference between distance learning on these platforms in the humanities or natural sciences and in the sciences, when you need to not only write or pronounce text, but also enter formulas, draw pictures and graphs. Google Classroom is more suitable for the humanities, although some lecture materials may use diagrams, tables, drawings or photographs. However, much more often graphic materials such as formulas, diagrams and figures need to be inserted by teachers of the sciences. This applies to mathematical disciplines (linear algebra, analytical geometry, probability theory, mathematical statistics, discrete mathematics, mathematical analysis, numerical methods, mathematical modeling of various processes, resistance of materials, etc.), as well as physics, chemistry, economics and others.

During chat classes and web classes, there are three main ways to demonstrate formulas, graphs and figures [11, c. 133-134].

1. Using a tablet or online whiteboard with a mouse. This method requires some adaptation and can be difficult if you need to display a lot of formulas or graphs.

2. Orienting the webcam not at the teacher, but at his desktop. This allows students to see the writing or drawing process, which makes it easier to understand the material. The quality of the video depends on the camera and internet connection. While on the Skype platform you can use a regular pen, in Zoom you have to use markers due to the lower video quality. This method provides a faster teaching pace compared to

an online whiteboard. Class recordings are also stored, allowing you to reuse the materials.

3. Gradual publication of pre-prepared materials (texts, formulas, graphs, diagrams, tables) via Google Classroom or method 2. However, this method involves the use of only static materials and reduces the level of live interaction with the audience.

The Google Classroom platform provides integration with other Google tools, such as Google Docs, Google Drive and Google Meet. It has many advantages, but also some disadvantages (Table 3).

Table 3
Advantages and disadvantages of Google Classroom

No	Advantages	Description	Disadvantages	Description
1	Free	Google Classroom is free for users, making it accessible to everyone, including schools, teachers, and instructors. This is especially useful for educational institutions with limited budgets.	Limited customization options	While Google Classroom is convenient, it doesn't have the same flexibility in customization as some other learning management platforms (like Moodle or Blackboard). For example, the ability to customize the interface design or add advanced features may be limited.
2	Integration with other Google tools.	The platform integrates seamlessly with other popular Google tools, such as Google Docs, Google Sheets, Google Drive, and Google Meet. This allows you to create, store, and organize educational materials without the need for third-party programs.	Lack of a full-fledged grading system.	While you can assign grades and provide feedback, the grading system is fairly basic. For example, there's no built-in ability to take comprehensive tests or automatically check complex assignments (like in Moodle).
3	Ease of use.	The Google Classroom interface is simple and intuitive, making it convenient for users of all ages and technical levels. For both teachers and instructors, the platform is easy to learn.	Dependence on Google.	The platform is tightly integrated with other Google services, so users must have a Google account. This can be a drawback for those who don't want to use other Google services.

4	Organiza- tion of tasks and materials	Google Classroom allows teachers to create and organize assignments, tests, materials, and other resources. Assignments can be assigned to students with clear deadlines, as well as the ability to leave comments and grades.	Archiving issues.	It can sometimes be difficult to find old materials or assignments, as the archiving and storage system may not be as flexible as in other learning platforms.
5	Ability to interact and communi- cate	The platform has messaging features between teachers and students, and also allows you to create discussions and group chats. This improves communication and collaboration in the classroom.	Limited control over content.	Teachers have limited control over how materials are presented to students. For example, they can't create full courses with videos and interactive elements, as they can in some specialized learning management systems.
6	Availability on different devices	Google Classroom is available on all major platforms: computers, tablets, and mobile phones. This provides convenient access to educational materials from any device with an Internet connection.	Limited multimedia support.	While you can add documents and links, the ability to integrate with multimedia resources, such as complex video lessons or interactive activities, is limited.
7	Assessment automation	Google Classroom allows you to automatically grade assignments, especially if they are completed through Google Docs or Google Forms. This simplifies the process of checking and grading.	Scalability issues.	In large organizations or for educational institutions with a large number of students, Google Classroom may be less effective due to the limited number of settings for administrators and class management.
8	Ability to work together.	Students can work on joint projects, use shared documents, which allows you to organize group work in real time.	Requires an internet connection.	Since Google Classroom is a cloud service, it requires stable internet access to access it. This can be a problem for those with limited network access.
9	Security and privacy.	The platform uses a high level of data protection, in accordance with Google policies, and allows you to limit access to educational materials only to students and teachers.	Inconvenience when working with precise disciplines.	It is difficult and inconvenient to insert formulas, graphs, pictures, and special characters into tests. There are other inconveniences.

Source: author's development.

However, MyTestX also has some drawbacks. They are not critical for all users, but for those looking for advanced features, they can be significant limitations. For the sake of convenience, the advantages and disadvantages of these tools are summarized in Table 4.

Table 4
Advantages and disadvantages of MyTestX

No	Advantages	Description	Disadvantages	Description
1	User-friendly interface	MyTestX has an intuitive interface that allows you to quickly create tests, making the program user-friendly even for users without technical experience. This makes it easier for both teachers and students.	Limited functionality in the free version.	Many users note that the free version of the program has significant limitations compared to the paid versions, which may limit its use for more complex or scalable testing.
2	Support for various question types.	The program allows you to create various types of questions, such as multiple choice, fill-in-the-blank, true/false, and open-ended questions. This allows you to create a variety of tests suitable for different levels of difficulty.	Low flexibility in settings.	The interface and customization options may not be flexible enough for certain users. For example, there are limits on the number of question types or an interface that does not allow for free customization of the test appearance.
3	Flexible test settings.	MyTestX allows you to customize various aspects of the tests, such as time to complete, number of attempts, random movement of questions, which provides greater flexibility in using the program.	Low flexibility in settings.	The interface and customization options may not be flexible enough for certain users. For example, there are limits on the number of question types or an interface that does not allow for free customization of the test appearance.
4	Automatic scoring.	The program has a built-in automatic grading function, which significantly reduces the workload of teachers, as test answers are automatically checked and instant results are provided.	Support for basic formats only.	The program may not support more complex formats or question types that may be important for specific testing needs, such as interactive or multimedia questions.
5	Collection and analysis of results	MyTestX allows you to collect data on test results, which helps teachers and administrators analyze the effectiveness of testing and evaluate the progress of students or pupils.	User interface issues.	Some users report shortcomings in the interface, including inconvenience in use and lack of intuitiveness in setting up and managing tests.

6	Flexible test creation system.	The program allows you to create both simple and complex tests. This allows you to create tests for different types of participants, including both beginners and experienced users.	Support and documentation	Insufficient support from developers or limited documentation can make it difficult to solve problems, especially for new users who are not familiar with the program's functionality.
7	Data security and protection.	MyTestX has features that ensure the confidentiality of test results, as well as the ability to protect access to tests with a password.	Limitations in analytics	Tools for analyzing test results may be underdeveloped or not provide deep and accurate analytical data, which limits opportunities for improving the learning process.
8	Ability to import and export data.	The program supports importing and exporting tests and results to various formats (for example, Excel or CSV), which is convenient for further processing or analysis.		
9	Support for various platforms.	MyTestX can work on different operating systems and devices, which allows users to easily access tests from computers, tablets or mobile phones.		
10	Ability to personalize.	The program has the ability to add custom settings for tests, create topics or categories for test questions, which allows you to customize the interface to specific user needs.		

Source: author's development.

Based on our own experience, we propose to improve the Google Classroom platform to ensure more convenient teaching of exact disciplines.

1. In Google Classroom forms, there is no possibility to directly enter formulas, drawings or graphs, as in the MyTestX program. Currently, it is necessary to first convert them into a drawing format (jpg or jpeg) using a graphic editor, for example, Paint, and then add this file to the form, which is inconvenient and time-consuming. In addition, a drawing can be inserted only once into each question, which concerns both the task itself and the answer options. In the case when the text of the task contains several formulas that must be presented as drawings, it becomes

necessary to convert the entire text of the task or answer options into jpg or jpeg format. It would be much more convenient if the platform allowed teachers to directly insert formulas into the text of the task or answer options, rather than uploading them as separate drawings.

2. In addition, there is a need to convert text containing superscripts and subscripts, as well as other specific symbols and letters, into a picture format. It would be advisable to avoid this step and allow such symbols to be entered, as MyTestX allows, directly into the text of the assignment, without the need to convert it into a picture.

3. The same applies to entering pictures into a Google Classroom "form": you must first convert them into a jpg or jpeg file using a raster graphics editor, such as Paint, and then upload this file via cloud storage, which takes additional time. It would be much more convenient if pictures could be entered directly into the text of the assignment, without the need to convert them into separate files. In the MyTestX editor, a picture can be entered in two ways: 1) directly from a Word document into the MyTestX form; 2) by inserting it into the picture field in the way described above.

4. The Google Classroom platform does not provide clear instructions for students (pupils) on how to correctly write their full names so that teachers can work with the list conveniently. It is recommended to write the first name first, then the last name, since the platform sorts by the second word (last name), and only then by the first name (first word).

5. All technical information on Google Classroom and Google Forms is provided only in Russian, while we use Ukrainian for teaching, which creates additional difficulties.

6. There are problems with checking assignments, since the platform does not sort by completion time. It only indicates whether the work was submitted on time or late.

7. If a student (pupil) submits work a second time, this is not recorded in the system. In order to find out this, you need to view the history of each student (pupil) or carefully read the comments that students may not leave.

8. When new works are submitted without delay or with delay, it can only be found out by the difference between the number of works that were submitted and the number of works that were checked and recorded by the teacher (this must be done manually). Sometimes information indicating who submitted the work late helps with this.

9. Only 20 photos can be sent to Google Classroom when completing assignments. This limitation creates a problem for large calculation

works that do not fit into the specified number of files. Instead, students are forced to send works in Word format, which degrades the quality of the images.

10. Sometimes there are difficulties with reading and perceiving the information provided, as well as with presenting it in a convenient form for checking.

11. Often, information sent to Google Classroom is distorted or not readable at all, so it becomes necessary to submit it in PDF format. Such problems do not arise in the MyTestX program.

So, the distance learning platforms currently used in Ukraine (Zoom, Google Classroom, Moodle, Google Meet) have a number of shortcomings that complicate the teaching of exact disciplines, in particular mathematics. Moreover, in comparison, most of these shortcomings are absent in the MyTestX editor.

The article proposes ways to improve these platforms to improve the teaching process, in particular in the following aspects.

1. Introduction of graphs and figures.
2. Introduction of formulas.
3. Possibilities of using superscript and subscript indices, as well as other specific symbols and letters when directly entering texts into the form (without the need to first translate them into figures).
4. Informing users that sorting students is carried out not by the first word - name, but by the second - surname.
5. Support for the Ukrainian or multilingual version of Google Forms and Google Classroom.
6. Introduction of sorting by task completion time.
7. Informing about the arrival of new versions of works.
8. Easy tracking of new works.
9. Increasing the number of photos that can be sent.
10. Improving the quality of information and its convenience for verification.
11. Avoiding distortion or inability to read the information sent.

Modifying the interface of distance learning platforms will significantly facilitate and speed up the process of creating tests or exam tickets in mathematics and other disciplines, make tasks more convenient for students and teachers, and improve work with lists of students and tests.

We also believe that it is worth providing benefits for mobilized students who wish to continue their studies, and not simply transferring them to academic leave, as is done now.

Given the frequent power outages in various cities and districts, as well as the threat of the collapse of the country's energy system, we propose to switch to a flexible schedule of classes in a dialogue format, where participants can join classes at any time. For those who were unable to participate for good reasons, it is advisable to automatically send electronic copies of classes, which will greatly simplify access to educational material.

4. Conclusions

Thus, the article considers modern platforms designed for distance learning and analyzes them in terms of advantages and disadvantages. A comparative analysis of the Google Classroom and MyTestX platforms was made, the choice between which depends on whether you need only a system for assessment or a comprehensive tool for managing courses and interacting with students. It was emphasized that tests and tasks in exact disciplines are easier, simpler and faster to enter in MyTestX than in the forms of the Google Classroom platform, where formulas, drawings, graphs, numbers with superscripts and subscripts, as well as other specific symbols and letters, must be previously translated into graphic form, for example, through the Paint editor.

The article also proposes a number of improvements that can significantly improve the process of preparing and conducting classes in a remote form on the Google Classroom platform. Special attention is paid to specific proposals for improving the remote teaching of mathematics and other exact sciences on these platforms.

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Abstracts

МИКОЛА МОРМУЛЬ, ДМИТРО ШЧИТОВ, ОЛЕКСАНДР ШЧИТОВ, ЛЮБОВ РОМАНЧУК. **Пропозиції щодо вдосконалення платформ Google Classroom та MyTestX у дистанційному навчанні точних дисциплін.** У статті порівнюються дві широко використовувані платформи онлайн-навчання Google Classroom і MyTestX та їх застосування у викладанні точних наук, таких як математика, фізика, хімія та інші. Розглядаються основні особливості, переваги та недоліки кожної платформи. Особлива увага приділяється тому, наскільки добре вони підтримують інтеграцію візуальних елементів, таких як формули, графіки та діаграми, а також простоті створення та проведення тестів та іспитів. У статті також надано рекомендації щодо покращення використання Google Classroom для дистанційного викладання точних дисциплін, що відповідає сучасним потребам інтерактивності та технологічної підтримки освіти. Висвітлюються конкретні шляхи покращення дистанційного навчання з математики та інших точних наук на цих платформах.

Ключові слова: платформи MyTestX, Google Classroom, Skype, чат-сесії, точні дисципліни, дистанційне навчання.

MYKOŁA MORMUŁ, DMYTRO SZCHYTOW, OLEKSANDR SZCHYTOW, LUBOW ROMANCZUK. **Propozycje usprawnienia platform Google Classroom i MyTestX w zdalnym nauczaniu przedmiotów ścisłych.** W artykule dokonano porównania dwóch powszechnie stosowanych platform do nauki online, Google Classroom i MyTestX, oraz ich zastosowania w nauczaniu przedmiotów ścisłych, takich jak matematyka, fizyka, chemia i inne. Analizowano kluczowe cechy, zalety i wady każdej z platform. Szczególną uwagę poświęcono temu, jak dobrze wspierają one integrację elementów wizualnych, takich jak wzory matematyczne, wykresy i diagramy, a także łatwości tworzenia oraz przeprowadzania testów i egzaminów. W artykule przedstawiono również zalecenia dotyczące usprawnienia wykorzystania Google Classroom w edukacji zdalnej w zakresie przedmiotów ścisłych, odpowiadając na współczesne potrzeby interaktywności i technologicznego wsparcia procesu kształcenia. Podkreślono konkretne rozwiązania umożliwiające ulepszenia w procesie zdalnego nauczania matematyki i innych przedmiotów ścisłych na tych platformach.

Słowa kluczowe: platformy MyTestX, Google Classroom, Skype, sesje czatowe, przedmioty ścisłe, nauczanie zdalne.