iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** III **Month of publication:** March 2020

DOI: http://doi.org/10.22214/ijraset.2020.3021

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

Replacing the Classic Learning Form at Universities as an Immediate Response to the COVID-19 Virus Infection in Georgia

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Abstract: ***The high education system in Georgia currently is based only on the classical form of education, where the classrooms are led by the lecturers face-to-face with their students. Although the old system before 90-s could have lectures in the form of tuition by correspondence, this kind of system was cancelled. The modern system got under challenge when from March 02 of 2020 the education process was suspended in universities and schools countrywide due to the spread of COVID-19 coronavirus by the recommendation of national centre of disease control of Georgia. As previous practice shows universities would have to recover the missed classes in summer, or even in autumn that is a very uncomfortable period. As an alternative online interactive teaching was proposed using products that are part of G suite for education, such as Gmail, Classroom, Calendar, Forms, Jamboard, Drawings, Drive, Hangouts meet and free software Open broadcast studio. All of the products were tested. Paper includes the resolutions and recommendations for universities and colleges to quickly change the study form from face-to-face to online with minimal expenditures.***

Keywords: Online education, G suite, Classroom, Face-to-face to online, Distance learning, University education, Webinar

I. INTRODUCTION

The thigh education system in Georgia (country), uses the classical form of education. The Universities and corresponding programs are accredited by the national center for educational quality enhancement. Currently Business and Technology University has about 3000 students for its 3 years of existing with 4 programs. The teaching process has been held in face-to-face classical form at classrooms equipped with projectors and computers. In March of 2020 the learning process was suspended in the country by the recommendation of the Ministry of Education, Science, Culture and Sport of Georgia [1]. The head of national center for disease control and public health directed the universities and suggested to share the best practices that some large countries like china had used, when large meetings, conferences and classes are getting organized in virtual, online environments instead of traditional approaches [2].

The holidays announced for making disinfection procedures in the buildings, were used by us to start testing new platforms to quickly transit the learning process from face-to-face to online.

We needed to pick out an online education platform for this situation. The platform must meet the following criteria:

1) Connecting with the lecture and at least 50 other students at the same time, via video interactive conference;
2) In case of online lectures lecturers may need to use discussion to make teaching process more organic and realistic;
3) For students, that don't have access to high-speed internet connections, the streams have to be recorded and uploaded;
4) The online lectures should be accessible not only by computers but mobile phones;
5) Should have the option to watch recorded lectures that they missed with capability of rewind;
6) The ability for students to complete/hand in online homework, quizzes and tests.

We analyzed the capabilities of Google's G Suite for education which could complete the tasks motioned above effectively and considerably faster and others.

The aim of the paper is to find the solution for the force major situations using freely available tools and services for universities. The capabilities of different products from G Suite for education are reviewed in detail and the outcome from the ongoing situation is provided.

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II. LITERATURE REVIEW

Classical face-to-face classes are facing the great competition from massive open online courses from “Coursera”, “Edex” and education portals like “Udemy”, “Linuxacademy”, “Pluralsight”, where the student pays for the video lectures, led by the professors, or industry specialists [3]. These kinds of online lectures of course have some lack of communication but also have some advantages: they can be played offline with the possibility to pause seek backward or replay the content again. It is possible to have subtitles, slow down or speed up the videos if the lecturer speaks too fast or slow [4]. Existing research shows that the results of the students’ performance in case of online learning are slightly better than in the case of face-to-face courses [5],[6]. Google Classroom is one of the most well-known platforms for enhancement of teacher’s workflow [7]. The google classroom software engineer A Chehayeb also described “the saving of time” as one of the advantages of the system [8]. Google Classroom together with other free tools and services are available for free through G Suite for Education project.

This method of distance learning might be the best choice for every student of our university programs in forced situations.

This type of teaching has more advantages, then disadvantages.

Study from Anywhere, Anytime:

The best thing about the distance education is you could learn it from anywhere and at any time. It does not matter in which part of the country students are living in they can connect online lectures by your schedule. Students also could easily get access to course material. [9].

No Commuting:

Nagrale stated that if students are opting for a distance education, then they do not have to commute in crowded busses or local trains, which raises the risk of infection. Students need a computer with an internet connection in their homes. [10].

There is only one reason in which this model of learning may be unsuccessful.

Complicated Technology:

Brown explained that any student seeking to enroll for a distance learning program needs to invest in a range of equipment including computer, webcam, and stable internet connection. There is absolutely no physical contact between students and instructors as instruction is delivered over the internet. This overdependence on technology is a major drawback to distance learning. In case of any software or hardware malfunction, the class session will come to a standstill, something that can interrupt the learning process. Moreover, the complicated nature of the technology used in distance learning only limits online education to students who are computer and tech savvy. [10]

III.SYSTEM ARCHITECTURE

University is using the G suite for education – the free service from google that provides the free access to mail, calendar, drive, classroom, meet and other google services. The G suite is a set of cloud based services, meaning that host organisation does not have the need of purchasing, installing and maintaining of the server or software infrastructure. The web admin console is used to manage all services and accounts from the single sign in place. All of the students and lecturers are given the university domain email as soon as they are enrolled and sign the contract. Gmail can be used for sending information to the users about the learning process that includes the notifications from the Google classroom system. Each time the lecturer makes new announcements or deadlines are coming for the assignments, emails are sent to students. Currently in the spring semester of 2019-20, total 120 lecturers are assigned to courses, having different quantities of groups spread through the weekdays. As the report from the G suite administrator console shows Email, Drive, Calendar services are actively used by the users. (Fig. 1)



Fig. 1 Apps usage activity report for 6 months (01.09.2019 – 01.03.2020)

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As the students already were enrolled to the groups and the flipping to online classes is a temporary outcome from the situation in the country because of COVID-19 virus spread, the final exams are intended to be held at the university premises and the schedule of online courses will be the same as it was intended before.

To continue the learning process in the virtual online environment several, google products will be used:

1) *Gmail:* Email system for official communication;
2) *Classroom:* Environment where the course groups are created and managed by the lecturers, learning materials and home works are given and collected for checking;
3) *Forms:* Part of Google Docs, where a lecturer can create a quiz form.
4) *Calendar:* Setting up the meeting (online lecture) time and dates with reminding possibilities for the students and lecturers;
5) *Drive:* Recorded classes (meetings) will be uploaded to the drive folders and shared to the class members;
6) *Jamboard, Drawings:* The online board tools from Google where the boards and drawings can be shared to the users;
7) *Hangouts Meet:* Online meeting environment, where the video conference will be held with capacity of up to 100 students;
8) *OBS (Non-Google product, open free software):* Will be used to record the meetings into the files.

A. Gmail

Gmail is the main product from G Suite for education that provides an unlimited number of free accounts to the universities as an email service. These accounts have unlimited mail and drive storage capacities. Google groups are also available to form the mailing lists of the groups for easy distribution of news and alerts among the lecturers and students.

B. Classroom

Google Classroom is a free online platform where the lecturer can create the virtual class and invite / add students to the groups. It helps the lecturer to have course materials and classwork/homework structured, in the clean and intuitive form. To create a class, the system requires class name, together with optional section, subject and room number information as shown in fig. 2

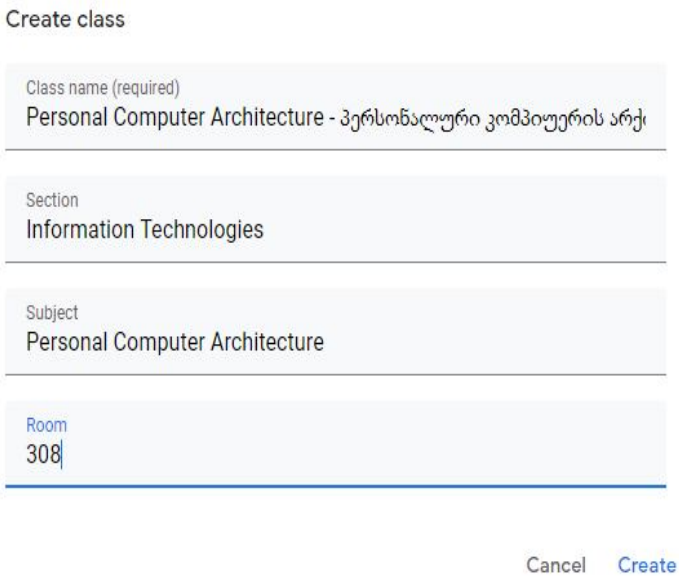


Fig. 2 Creation of new classroom

As soon as the new class is created, the system will show four sections: Stream, Classwork, People and Grades.

First step is to add students to the class. For this purpose, there is a class unique invitation code generated automatically for each particular class. As the user enters this code during the first login, the system will add a student to the corresponding class. An alternative way of adding new students is to have a list of emails entered or copied to the search field. Second step is adding course materials with indication of Material Title, Description, and uploading file, link, YouTube video or google drive file to the course. In our case this function will be used to upload reading material and recorded video file to the class. (Fig. 3) the structure of the course should match the official syllabi of the course. Classroom teacher can send emails to the individual student or a group.

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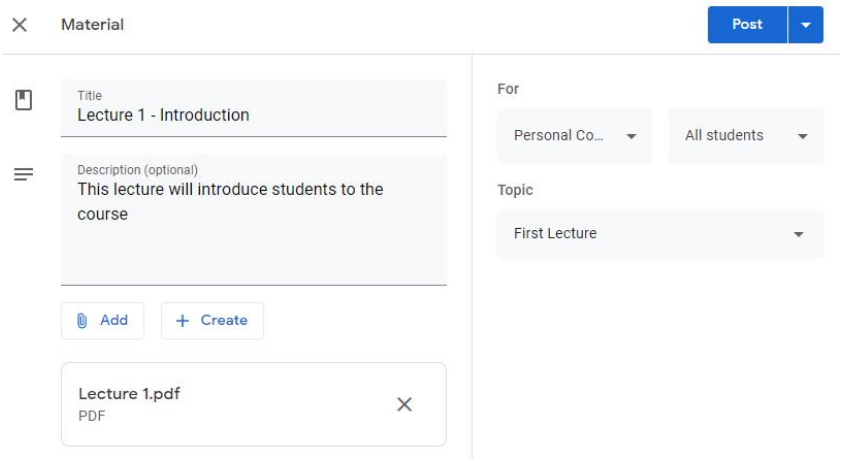


Fig. 3. Adding course materials to the classroom

Assignment information have to include the title and optional instructions, also the total points that will be used for estimation, due date and topic can be indicated. The rubric gives the possibility to have the points estimation explained to the student with several sub-components. There is option to have the assignments checked for originality using google search to compare the assignment answer to millions of sources. The reports are viewable for 45 days while each lecturer can check 3 assignments and each student can check same assignment 3 times for free, as the university currently does not have G Suite Enterprise for education package, as it is currently unavailable for the country. (Fig. 4)

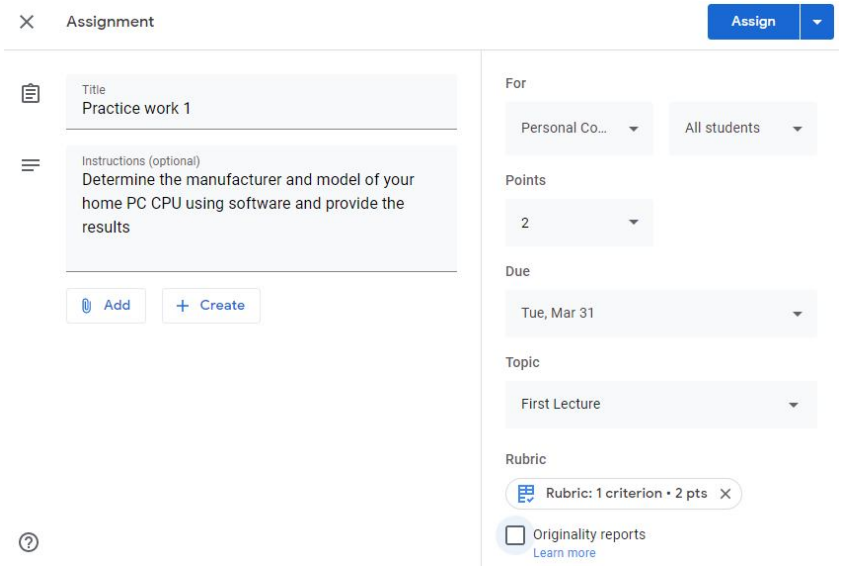


Fig. 4 Creation of the assignment in the google classroom

C. Forms (Part of google Docs)

As part of classwork G Suite for education gives a possibility to create the quiz in one of the products of google docs – Forms. Created quiz can be directly attached to the Classroom group as an assignment (Fig 5). The type of the questions can be simple multiple choice, open question with short answer or paragraph. Questions and also the answers can have the photos and also videos together with the text description. Each question can have its own point value and correct answers. The system can validate the answers based on pre-defined values and navigate to other sections based on them. There is also an option for the student to upload and submit a file as an answer. Such file cannot be automatically checked for correct answer and the lecturer has to open it later. System has option to shuffle the order of questions and the suggested answers as well. The filling of the forms can be limited to the domain of the university. At the end the quiz results can be seen in the results page separately for each student and also as a general report. The quiz values of each student can be automatically retrieved by Classroom assignment.

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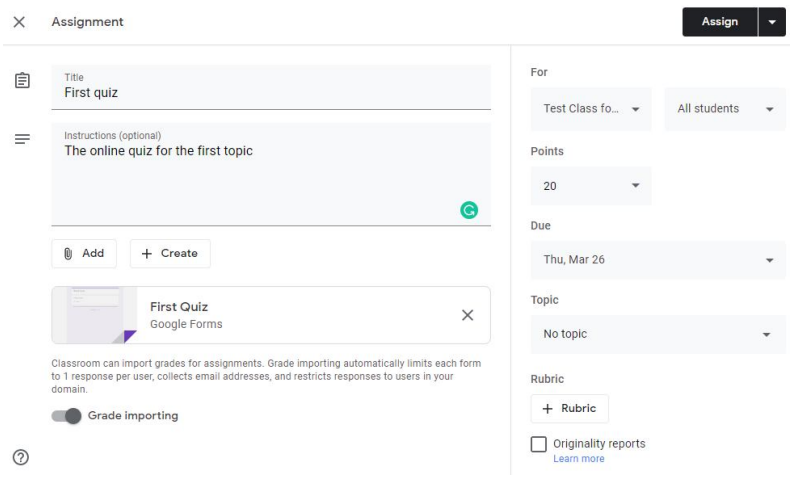


Fig. 5 Creating the Quiz Assignment in Classroom using Forms

D. Calendar

Google Calendar is a cloud-based calendar, where the user can assign the important events to the dates with different duration periods. Calendar from one account can be shared to other by creating assignments and deadlines google classroom creates the separate calendar for each class and puts the deadlines on it, the calendar is shared with the enrolled students.

E. Drive

Google Drive is a cloud file storage platform. University students and lecturers can create structures of the folders where they can upload an unlimited amount of their files from the computer. Files to the drive can be saved directly from the email attachment as well. Files and folders belong to the creator, who can share them to other users with different rights:

1) *Public on the Web:* Anyone on the internet can find and access. No sign-in required.
2) *Anyone with the Link:* Anyone who has the link can access. No sign-in required.
3) *On – University Wide:* Anyone at University can find and access.
4) *On – Anyone Wide:* Anyone at University who has link can access.
5) *Off – Specific People:* Shared with specific people (entering email of each person is required)

Each class created in the google classroom creates a drive folder as well, where all course uploaded materials are stored. This folder is shared to the students and is accessible from their drive portal.

F. Jamboard and Drawings

Jamboard the interactive whiteboard hardware created by google. For G Suite for Education customers, Jamboard starts at USD $4,999 (includes 1 Jamboard display, 2 styluses, 1 eraser, and 1 wall mount) with a one-time management and support fee payment of USD $600. As hardware it represents the 55” 4K UHD display with WIFI 802.11ac 2x2, NFC, 1 Gigabyte Ethernet, Built-in wide-angle camera, speakers, and microphone. It also includes 2 writing styluses and an eraser. (Fig 6).



Fig. 6 Google Jamboard – whiteboard alternative hardware

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This device makes a good alternative to the whiteboard in the class, but is limited for sales only to USA. There is alternative way to use web and mobile applications that represents the virtual whiteboard functions on computers or mobile devices. The virtual whiteboards, called as Jams can be titled and framed. Available tools allow to draw and erase using mouse or touch, write notes, add images to the boards, and highlight the objects with laser tool. Jams can be shared with options described in *D. Drive* section of this paper to the students so they can see the process in live. This tool will enhance the online teaching process by replacing common classroom whiteboards. Jams are available to be downloaded as PDF documents and together with the Jam links can be uploaded to the Classroom course materials at the end of each lecture.

Drawings is another product by google that can be used during the teaching process to create complex drawings with more available tools, but cannot be considered as quick drawing tool as Jamboard. It also does not group materials under one topic. It also has the typical sharing functions.

G. Hangouts Meet

The new google hangouts Meet platform is available in free and enterprise editions for education. The free version of meet can have up to 100 participants, while the enterprise for education can allow up to 250 participants. The product is supported by Android, iOS systems, most popular web browsers and special Hangouts Meet hardware, Chromebox and Chrome base for meetings devices. It is also possible to join the video meeting using several ways: Through browser and mobile app, Google calendar, Meeting link URL or code, special hardware.

We'll discuss two of the easiest ways to setup the meeting. First way to schedule the meeting is to use the calendar and appoint the lecture day and time, while adding the conferencing option and indicating the Join Hangouts Meet and corresponding classroom class name. Additional options menu can be used to indicate the frequency of class meetings, so the meetings will be scheduled for all periods. (Fig. 7). Calendar link will provide the students with the direct access to the meeting.

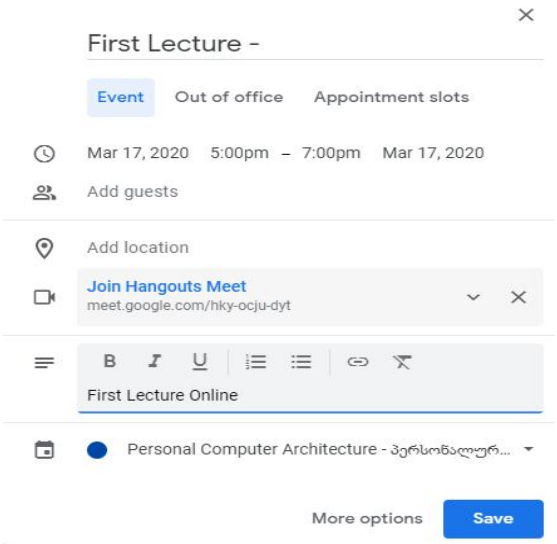


Fig. 7 Generation of Hangouts Meet link and adding lecture to calendar

The second way of starting a meeting is by opening the web page http://meet.google.com and choosing the "+Join or Start Meeting" option. If you were invited to the meeting the first screen will show today's meeting title and time with option to join. After joining the meeting, the user is offered to configure the camera and microphone by choosing the available devices and setting the send and receiving resolutions. Current quality sending options are: High definition (720p) and Standard definition (360p), while receiving options are: High definition (720p), Standard definition (360p), standard definition (360p), one video at a time and the audio only. Lecturer that is going to present has the option to select sharing options of the entire screen or one of the particular windows of the software (for example presentation, learning material, Jamboard or drawings software or browser windows. While the meeting is going on, the participants have the option to ask questions or have online chat in parallel.

To join a meeting without having internet or a computer is possible by calling the telephone number provided and entering the meeting code by phone. The meeting URLs will remain unique so the students can use it each time to join the event.

The important option that is missing in the free version of G Suite for education is the meeting recording. To overcome this issue the special free software can be used.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

H. OBS - Open Broadcaster Software

Open Broadcaster Software (OBS) is a free and open-source cross-platform streaming and recording software first released in 2012. Its main function is to manage different available input sources while creating the recording and broadcasting scene. The input sources can be one or a combination of these:

1) *Audio input Capture:* One of the microphones available on the PC;
2) *Audio output Capture:* The sound generated by hardware can be captured as the audio source;
3) *Browser:* Browser is opened internally by the software and added to the scene;
4) *Color Source:* A selectable color rectangle is placed to the scene;
5) *Display Capture:* Captures the entire screen as input
6) *Game Capture:* Can capture one of the running software windows, any full-screen application or foreground window with hotkey;
7) *Image:* Any image file can be indicated and added to the scene;
8) *Image slide Show:* A set of images can be selected so they will play as a slideshow on the scene;
9) *Media Source:* Existing media file from the computer will be played to the scene;
10) *Scene:* Another scene can be added to the current one as a source;
11) *Text (Gdi+):* TEXT with color, font and size properties can be added to the scene;
12) *Video Capture Device:* Available cameras are selected as a source and added to the scene;
13) *Window:* Any available window can be captured as a source to the scene

Test scene was created and different sources were added such as camera, microphone, window capture, web browser, text, and image. The recording format was defined as mp4. (Fig. 8). The software records the video scene to the local storage disk, but it is also capable of steaming the data live to the popular video services as YouTube, Twitch, Facebook, Livestream and more. For streaming the user have to log in to appropriate service and input streaming parameters such as stream key. In our case, we prefer to manually store the video recording of the meeting and upload the video file to google drive and add it to the classroom materials.

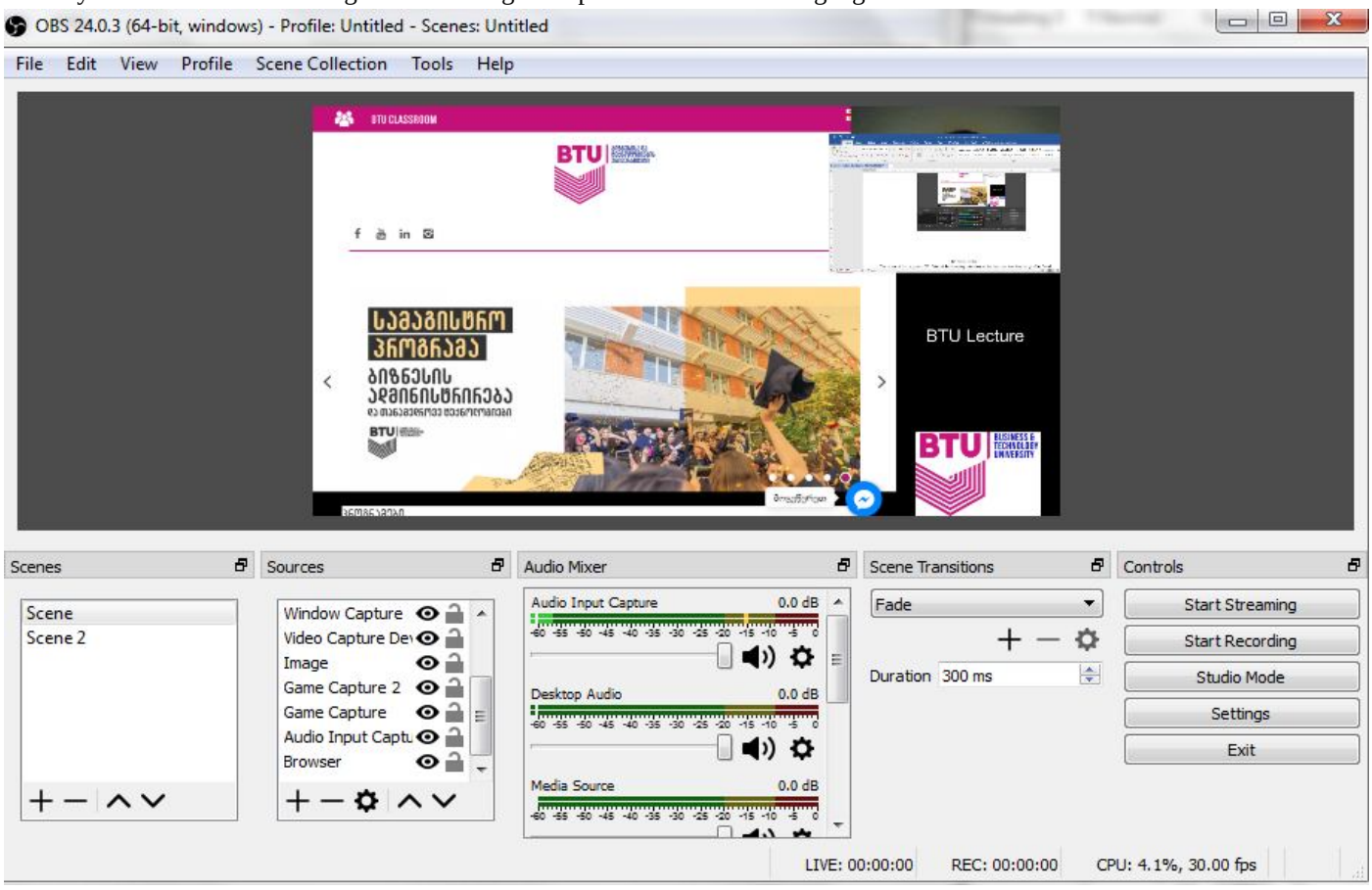


Fig. 8 Open Broadcaster Software configuration with several sources

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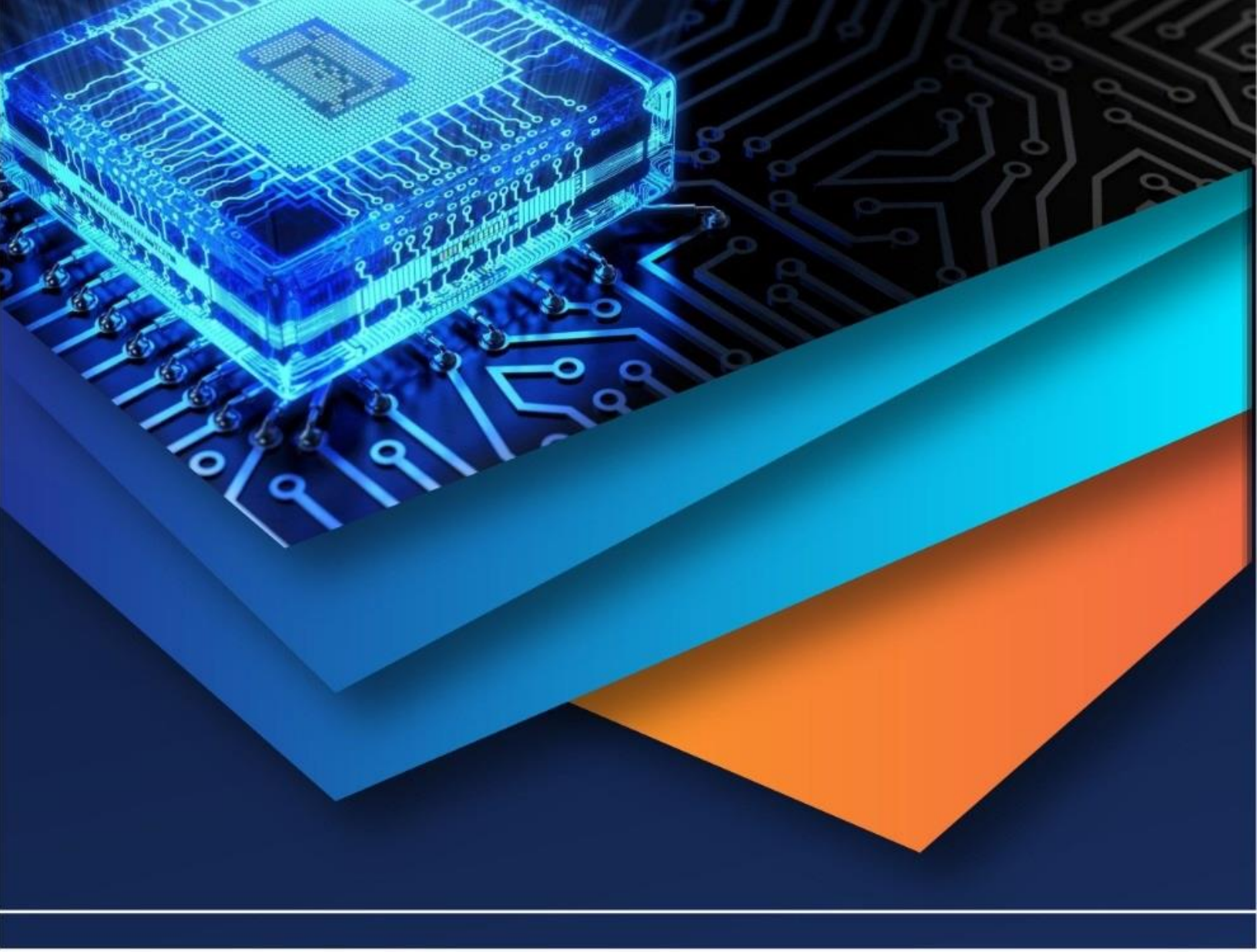
IV. CONCLUSIONS

As the COVID-19 virus spread was detected in the country, the recommendation of national disease control center forced the university to seek for the smooth, easy alternative ways to quickly change the existing form of face-to-face lectures to online meetings. For these purposes several available products of google were studied as Business and technology university, Georgia was already the subscriber of G suite for education for free of charge. 8 products were considered to be used in the new form of education: Gmail – for information exchange, Classroom – for creating learning environment together with materials sharing; Forms – a part of google docs that creates the online forms as a quiz that can be automatically integrate into the classroom's assignments; Calendar –Scheduling tool for online lectures, Drive – Storage for recorded lectures, Jamboard and Drawings – the online tools for drawing and writing that can replace the whiteboard, Hangouts Meet – live lecture environment with up to 100 participants and OBS - Open Broadcaster Software for recording the lectures as the G suite for education enterprise is not currently available for Georgia. All of these services were successfully tested and are ready for production.

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