Importance of Distance / Online and Blended Teaching -Learning, Modern Perspectives and Challenges

Introduction

Along with the increased access to information and communication technologies (ICT), the Internet, digital materials and devices, their role in people's personal, social or public life is gradually growing day by day. Without them today it is ubeliavable to:

- Create an "information society", ie. A society where the use and creation of information, especially creation of its highes form -knowledge, its management and integration are defining activities (Machlup, 1962); and consequently
- Elaboration of "knowledge based economy" which is of a critical importance for country socio economic development ie. the economy that is "built on ideas and creation and use of information" (Cambridge Dictionary, 2018).

The real perspective of the long-term economic development of the country implies the existence of labor resources actively involved in the process of scientific innovation, technological and knowledge acquisition and use. These resources should be able to quickly adapt to the labor market and to new challenges; In particular, the development of new required knowledge and skills, the acquisition of technological innovations in various fields and their effective use.

For these reasons, the development of the necessary infrastructure, the creation of an information society and active involvement in the world information space is considered a priority task for our country. Successful completion of this task is crucial to achieving strategic goals such as building a democratic, free and legal state, developing civil society, national security, protecting human rights, fighting poverty and corruption, and extremism.

Consequently, new forms of education (eg electronic, distance, online and blended- see details below) not only aim to develop relevant (technical) competencies for students, but more importantly, they play a crucial role "from any place, any time and any device", acquire the knowledge, follow the lifelong learning principle and apply gained skills in everyday life. Finally, these different forms of education are not only an important tool for achieving the goals of general education, but also envision the elaboration of effective education plicy and quality education: system monitoring, improved efficiency

and sustainability based on data, evidence - including analytics of learning at different levels (micro, meso and macro) .

In the last decade, as in other countries, the interest in e-learning and online learning and its quality has increased in our country. In particular, the Resolution of the Government of Georgia of 17th of December 2017 approved on the basis of N533 "Unified Strategy of Education and Science of Georgia 2017-2021", in the part of general education, among other tasks, sets out:

"Objective 2. Improving the quality of education to increase the opportunities for transition to the following levels of education, to develop life skills among pupils and to achieve better academic results" (p. 20), where, among other priorities of teaching-learning, the following two areas are distinguished:

- "Teaching exact and natural sciences, formation of competencies related to global and digital citizenship, literacy (including media literacy) and sustainable development";
- "Teaching European languages, science and technology, which will help pupils at each level of general education to be ready to move to a higher level" (pp. 20-21).

On the other hand, since 2017, a new Article 6 has appeared in the Law on General Education, which envisions the provision of distance / electronic form of education in general education institutions of Georgia. Prior to that, Teacher Training in distance form (Online Courses) within the education program, were also added to Articles 21 (Teacher Education) and 61 (Transition from Teacher Certification to Teacher Professional Development and Career Advancement Scheme). Note that neither of them provides for the simultaneous presence of the main participants in the process (student, teacher, trainer) in one designated place, but emphasizes "proper planning of the curriculum, use of appropriate approaches and methods in organizing and conducting the learning process."

While in our country, face-to-face teacher education (and in the case of ICT) and blended training has a relatively longer history, LEPL National Center for Teacher Professional Development, in 2019, for the first time started online / distance teacher professional training. Under the program, more than 6,000 teachers have been trained over the past two years through the Open edX-based online education platform. "

Despite significant achievements over the last decade, Georgia's education system still faces many challenges. This is evidenced by the findings of both national and international studies. For example, under PISA 2018, according to an assessment of 15-year-olds in the three major areas of learning (reading, math, and science), about two-thirds of students fail the (basic) second level. A similar unfavorable situation is in the case of PIRLS / ePIRLS 2016 - according to the latter, in the ranking of the countries participating in the study, Georgia occupies the last place in terms of all levels of achievement - Georgia has an average score of 4th grade pupils significantly behind the international average. Note that in the case of both studies, Georgian pupils in the relevant areas of assessment for the first time wrote the test in computer format (in the case of reading in the framework of PISA 2018, the test was in an additional computer-adapted format).

Finally, in the spring of 2020, under the COVID-19 pandemic, the Georgian government, like in other countries, was forced to close educational institutions to suspend the spread of the disease. Instead, the teaching-learning process was carried out remotely at all levels of education - with the help of teleschool, students and teachers across the country were involved in unprecedent online teaching experiment. At the global level, researchers are already referring to this forced experiment with the new term "emergency distance education / learnig".

In response to these old and new challenges, among other initiatives, in 2019 the Government of Georgia signed an agreement with the World Bank, according to which the World Bank will finance Georgia's education system with 90 million euros under the "Innovation, Inclusion and Quality Project". The general objectives of the project are: 1) to expand access to pre-school education and 2) to improve the quality of education and the learning environment.

The project will be implemented by the Ministry of Education, Science, Culture and Sports of Georgia (MESCS) with its centers and the Municipal Development Fund of Georgia (MDF) for a period of six years. Effective management and implementation of the project is ensured by a specially created management unit (PMU) with the Ministry of Education, Science, Culture and Sports of Georgia.

The project includes five components:

- Support to preschool education, increase access and improve quality;
- Support to learning – teaching quality improvement at all levels of general education;
- Enhancement of options of funding and support to internationalization of higher education system;
- Improvement of communication among all stakeholders of education system;
- Improvement of project management, monitoring and assessment systems;

The direct beneficiaries of the project are pupils of all levels of general and preschool education and their teachers; school principals, students of the higher education faculty of education sciences (future teachers).

Interventions under the project should significantly improve the quality of the education system so that it is able to train the future workforce; A workforce that is ready to meet the challenges of the 21st century - in terms of employment and professional self-realization in a rapidly changing, globalized and technologically advanced world.

The second component of the project is our special focus in this document:

Component 2 – Support to improvement of the quality of teaching-learning at all levels of general education - creating an educational environment in selected schools that facilitates quality education.

Within this component, the project should ensure the creation of a distance and blended learning platform targeting at both students and their parents, and teachers and school principals. The first category users, including children with disabilities and special educational needs, will be able to learn in a new environment, with new approaches, anytime and anywhere. The platform allows the second category users, to conduct the teaching-learning process both online and in a blended format, to collaborate with colleagues, to share open educational resources, modern approaches and practices of teaching and assessment.

The focus of the present study is to analyze the context and preconditions in the country and to develop recommendations for the effective planning of the tasks given in the second component of the project and its sub-components. The document is organized as follows:

- The first chapter describes the modern learning models, the ways of their design and implementation and the general and specific competencies required from the participants in the process;
- The second chapter provides a comparative analysis of open source and freeway distance and blended learning management systems (LMS) and social education networks (platforms), classification of preferred external (LTI, xAPI) tools (by purpose and use) and recommended open educational resources list;
- The third chapter provides an analysis of the current situation and context of distance and blended learning in the country. It stands on national and international research findings over the past two years: in terms of existing infrastructure (access to the Internet and digital devices), educational resources, competencies of students and teachers, and their attitudes towards new learning formats.

Main Findings

This section summarizes the findings of the report, which are conventionally divided into two parts. The first part deals with the design of distance and mixed learning and the requirements for process participants, modern pedagogy and teaching means; And the second part is the readiness to learn with these new forms: in terms of resources (access to the Internet and digital media) of the participants and their own competencies. The findings in the second part are based on the secondary statistical analysis of (quantitative) secondary data collected during the last two years as part of the national (Assessment in Mathematics 2018; Distance Learning Research 2020) and international surveys (PISA 2018 and TALIS 2018).

I. New forms of teaching – learning and its design

In addition to traditional (ie face-to-face) learning, the literature distinguishes five modern forms of learning: online, distance, e-learning, blended and virtual education. Each of them is based on a modern design, or framework, that helps us build a learning experience. Through it we can answer the following key questions:

- **What purpose? (general and specific / subjective goals of learning)**
- **What?** (for example: subject disciplines and / or teacher's subjective and general competencies);
- **How?** (education theories, resources, activities and instruments);
- **Where?** (for example: distantly / online or face to face); and
- **When?** (synchronized, asynchronized and mixed)

When designing learning in a new form, practitioners are guided by specific teaching theory (s) and principles. For example, in the case of online learning space design, the principles of Universal Learning Design (UDL) (i.e., modern inclusive design) are widely used in conjunction with the Flipped Classroom (Mazur, 1997) model; In technology-enriched e-learning design - Bloom's adapted taxonomy (Anderson & Krathwohl, 2001) - digital instruments are classified according to cognitive levels; When designing online learning for adults (e.g., teachers), they are guided, along with the previous two, by theories of andragogics (Wilton, 1980) and experimental teaching (Kolb, 1984). Together with UDL, we distinguish the following from the general principles of design:

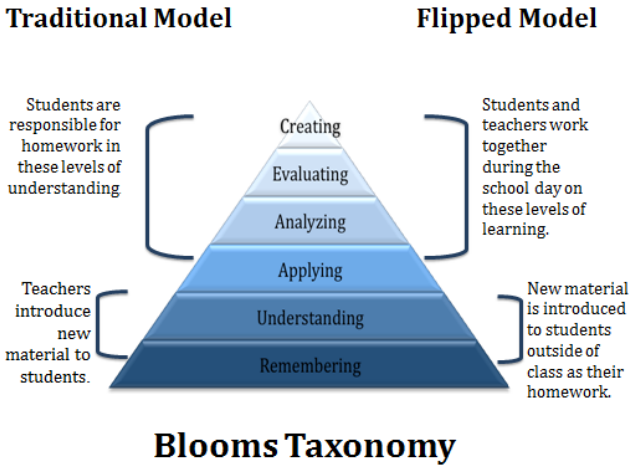
- Effective communication
- Active socialization and cooperation;
- Active and project based teaching;
- Timely provision of feedback;
- Resposnibility
- Communication of high expectations;
- Consideration of various forms (styles) of teaching.

I.1 Flipped classroom model

The design of distance and blended learning is often based on the flipped classroom model. This model involves reversing the basic steps of the learning process. For example, instead of explaining new concepts, topics by a teacher in a class, during the face-to-face meeting, students are introduced to them asynchronously as part of their homework (e.g., reading a text, watching a video, answering a quiz, etc.). That is, the construction of the first two categories of knowledge (declared and percentile) (physical or virtual) takes place outside the classroom. The construction of the third category of

knowledge (probation, or the use of knowledge) is already done synchronously in the classroom (face to face or online). The real time of the class is devoted to the interconnectedness of concepts and the practical application of knowledge. In the language of the updated Bloom Taxonomy (2001), this means that course participants are asynchronously involved in lower-level cognitive processes (knowledge and understanding), while they are able to develop higher-level cognitive skills (use, analyze, synthesize, and create) synchronously with their peers (or colleagues) and will have the support of an instructor (Brame, 2013). The illustration below compares traditional and inverted classroom models according to the sequence of learning steps.

Illustration 1: Comparison of blended and traditional design models using the Bloom Taxonomy levels.



Source: Goodwin & Miller (2013).

Although the planning of knowledge (memorization) and understanding phases is mainly for online asynchronous learning, student support in the individual learning phase is essential. Such promotion should be done using an appropriate element so that the learning resource, such as video, does not become an unwanted "knowledge transfer" model tool that participants may not watch (or misunderstand) at all. An example of a similar design element is the automated, online quizzes built into the video, which is one of the most effective (though not the only) means of providing an understanding phase. In addition, it is advisable for the course designer to include quiz questions inside the video (for example, using H5P Interactive Video or In-video-quiz XBlock). This, along with better retention of knowledge in the final understanding phase, also compensates for the lack of immediate feedback.

In the case of simple online learning design, the flipped classroom model can be implemented on a platform (for example, Moodle, Open edX, Google Classroom, etc.) to match the knowledge levels placed within the online course by organizing different types of activities in a specific sequence. In the more developed case, the relevant activities for each level / phase and the assignments for assessment are adapted according to the level of the course participant - through pre-defined branches of activities

on the learning trajectory or an automated (external) tool based on a statistical model. Out of two adaptation paths mentioned above, the first can be implemented in Moodle via Branche Structure, and in Open edX by one of its expansion tools, ALOSI Adaptive Engine.

I.2 Leaning Analytics

Learning analytics involves the automatic collection and analysis of data on students and the context of the learning process in a continuous, dynamic mode, and the presentation of results for the purpose of researching and understanding learning-teaching processes. Learning analytics should be collected at three levels of learning: individual, group (class) and overall platform (school). At all three levels, data collection, analysis and presentation are carried out through specific integrated and external tools; For example, course evaluation journal - Gradebook, course and platform level analytics (for example, LearnerScript for Moodle) and Figures or Analytics / Insights for Open edX. This is the most advanced, yet complex solution from the last one.

Learning analytics is the most important component of adapted learning, ie. makes it possible for students to deliver customized assignments and activities tailored to their level of development. Digital tracking is done through an external system (e.g. LearningLocker) for maintaining the individual participant interacting with individual learning units (e.g., how many minutes they watched the video, etc.). Finally, the required data is transmitted automatically from the learning space (platform) through a specific interface (for example, xAPI). Note that only some teaching-learning systems (for example, Moodle) have support for the xAPI interface.

Finally, we share one well-known example of such an open source and free-to-distribute tool for research and analysis of the effectiveness of online learning design and sequencing tools: LearnSphere / DataShop, developed by Carnegie Mellon University. It includes openly available (anonymized) educational data collected within existing courses, including MOOCs, and the results of their analysis. Additionally, the LearnSpere component allows WorkflowComponents to upload new data (for example, directly from a course log) and analyze it. DataShop offers customers the largest learning analytics infrastructure in the world: with widespread analytics methods, related data samples, and access to relevant resources.

I.3 Constituent circumstances of the teaching-learning space

The general goal of online (and mixed) learning is: "The transition from traditional implicit, belief-based practices to those that are explicit and design-based" (Conole, 2009, p. 129). In other words, it means learning from content fixed in a predetermined sequence (the so-called "knowledge delivery" model), authentic student activities, adaptive assignments based on their level of development, evidence-based assessment of their work, and ultimately students' own knowledge built and targeted transformation of using this knowledge for education design, ie Design is based on a constructive

approach, according to which the learning process is the result of the interaction of four main constituent environments (cognitive, pedagogical, social and emotional environments).

Cognitive environment - Implementing a cognitive environment in each thematic module of the online course involves the consistent development of activities. In the beginning, these activities are aimed at gaining specific experience, and then at building new knowledge, generalizing it and applying it. Because of the flipped classroom model participants are introduced to new ideas, concepts, and topics independently - often by watching videos or reading text independently - in the case of online learning - building a learning scenario, actively watching videos and reading text are the first activities in the cognitive space.

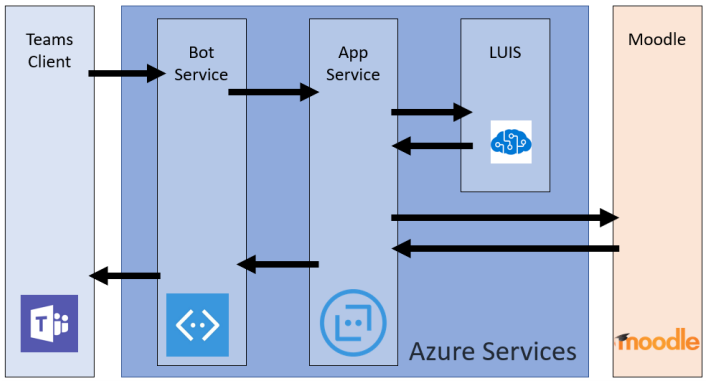
The pedagogical environment allows the course instructor (teacher) to support the effective facilitation of the learning process, both online and in the form of blended learning. The tools for its implementation are: polls, surveys, evaluation, feedback (including instant and summary), discussion, communication in various forms (eg chat, webinar and video conferencing). For participant evaluation, both Open edX and Moodle offer many types of assignments and activities, including open, closed, multiple choice, etc.

The social environment allows participants to communicate, collaborate, actively engage and reflect with peers (or colleagues). The ultimate goal of this active interaction is the social construction of knowledge. Achieving these goals is based on activities in the learning environment (big and small groups) that promote: research, evaluation and peer review, constructive criticism and positive feedback, summarizing, problem solving, open discussions and structured debate.

The collaboration element is implemented in the learning space by integrating cloud platform tools, for example, using Microsoft Office 365 or Google-relevant tools. In both cases there is a special extension (plugin, xBlock) for Moodle and Open edX. Through them, the instructor can share text documents, forms, calendars, presentation slides and spreadsheets with different rights.

Emotional, affective environment - it is planned in advance: by introducing game elements (gamification) to motivate students and stimulate interest, teamwork, collaborative learning and healthy competition. The most important role in the development of the emotional environment goes to the instructor, although it will be through the efforts of all participants. Its main purpose is to increase the students' positive "emotional presence" in the learning environment and the sense of belonging to the course's team. Achieving these goals is possible through team building and collaborative activities in the learning environment. For example, based on activities such as: getting to know yourself (or a teammate), introducing others, etc. An important element is gemification. The latter involves the use of game design elements in the teaching-learning process to motivate participants, increase engagement with learning materials, consolidate acquired knowledge, and build new knowledge. For example, these elements could be points, badges, leaderboards, and so on. At the advanced level, in the case of Moodle, a virtual helper based on artificial intelligence is also used Moodle Assistant Bot for Microsoft Teams.

Illustration 2: Moodle -integration into MS Teams and MS Assitance Bot .



Source: Microsoft (2019).

Its main function is to guide the learner in the right direction in the process of immediate feedback and completion of the task. It answers participants' questions about courses, assignments, assessments and other components of the course. Additionally, it allows Moodle messages to participants within teams!

I.4 Design Steps

Distance and mixed learning design steps are based on "backward design", according to which the learning objectives are first defined and only then the content, teaching methods and forms of assessment needed, are selected. When designing an online course, it usually involves the following steps:

- Define course objectives and outcomes and align them with the results of the national (or school) annual curriculum. For example, what subject and general competencies does it develop in the students, in which class, etc .;
- Defining the specific objectives of the course thematic units (Section, Unit) and the results to be achieved. What complex-functional tasks and activities should the student be able to perform at the end of a given thematic unit;
- Define the specific goals and outcomes of each lesson and activity within the thematic unit of the course;
- Selection, differentiation and conversion of existing face-to-face learning content and assessment resources to a new online format; Adaptation of existing resources in digital format, translation; and creation of new resources;
- Matching platform capability or online tools for each activity (mapping).
- Identify the evidence that contributes to the achievement of the learning objectives, use this information for determining the trainees levels of outcomes achieved by them;
- Identify and differentiate the actions (ie process) by the participants and the instructor that ensure the desired results.

Defining the general course, its thematic units and the specific objectives of the activities, its compliance with national (or school) curriculum is possible through tools such as: Moodle Competencies. Through it, it is possible to determine the competencies and the results to be achieved and link them to the thematic parts of the online course and individual activities. As a result, data on participants' progress in performance and achievement of outcomes and levels of competencies are collected over the course and users (eg students and teachers) have access to this information, and its visual representation is provided by the local learning analytics component of the course. However, it is desirable (although not necessary) that the annual curriculum (in the external system) exist in such a format that its content (competencies, results, indicators, etc.) can be imported directly (automatically) into the platform. We distinguish CASS from the curriculum management and publishing systems that enable the direct import of competencies into Moodle; One of its advantages is good compatibility with Moodle.

I.5 Specific example of teaching – learning platform

The following is a specific example of the implementation of a distance learning and blended learning education platform that enables its core users to conduct learning-teaching processes both synchronously and asynchronously. As in the previous sections, here too we rely on existing solutions when designing individual components of the system. The following is an example of such a complex system based on Office 365, Microsoft Teams, Moodle and Oppia Mobile. In the case of alternative design, where Google G-Suit applications (Google Classroom, Google Meet and Google Docs) are used in conjunction with Open edX instead of Microsoft services, it is possible to create a system with the same functionality and capabilities. It is also important to note that choosing either of these two alternative approaches will make it possible to collect and use learning analytics at both the local (school) and system level.

The opportunity for teachers to collaborate also involves sharing the resources they have created or discovered (open) (OER) and their own practices with colleagues. In this respect, Moodle has the most effective external tool compared to other alternatives (eg Open edX, Edmodo, Google Classroom, etc.) - Moodle Net, which is actively developing at this stage. It is based on the principles of social networking and is closely integrated with Moodle. Through it, users with the role of instructor can: search for open resources (activities and materials) in digital format on the platform and send them directly to their own course; publish own activity in Moodle Net in digital format created in own course; Create tags on published resources, like them or flag them as disliked and notify the platform administrator about it.

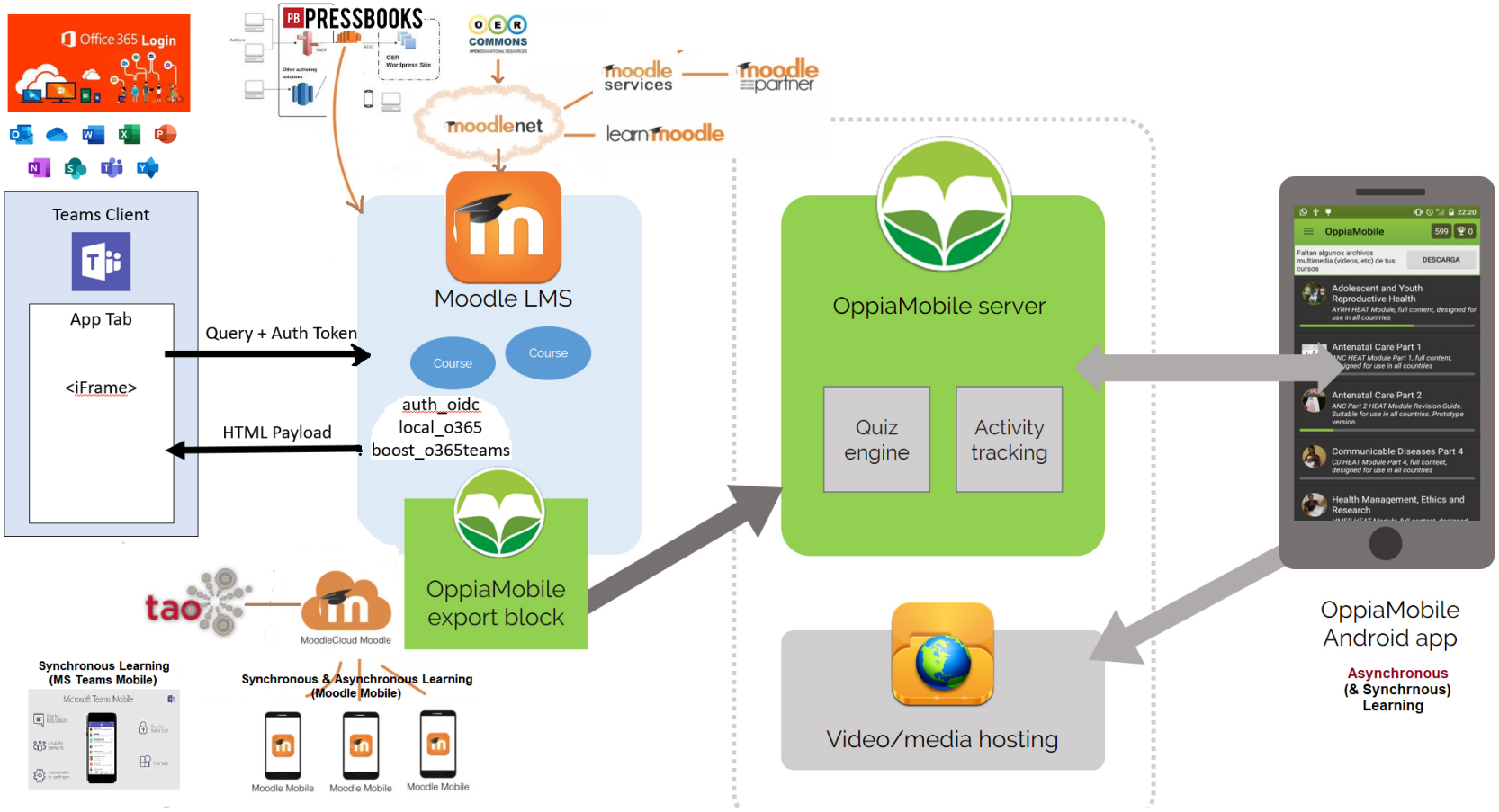
Note that in the case of Open edX, there is no direct analogue of Moodle.NET. Nevertheless, in Open edX, the user can act as the course designer (creator): archive the entire course and share it with others; Placing individual course elements in the (Open edX Content Library) or Open edX Blockstore

The platform for synchronous and asynchronous learning consists of the following components:

1. A platform for users with the role of course designer and online instructor (Moodle.NET);
2. Learning-Teaching Management System (Moodle LMS) closely integrated with Moodle Net; Thus, users with the role of course creator can: search for open resources (activities and materials) in digital format and send them directly to their own course; live publishing of the activity in digital format created in the self-exchange directly in Moodle Net (with its brief description and instructions on it); Create tags on published resources, like them or flag them with dislike and notify the platform coordinator about it;
3. Video conferencing tool (Microsoft Teams) in which Moodle LMS is tightly integrated; So that the user can see the Moodle tools and the courses placed in it directly inside the Teams, in one field of view and work in integration with the mentioned tool. (Note: Achieving this integration will require Microsoft's Azure service, which is licensed by the state each year);
4. Office 356 applications (Microsoft Docs, Excel, Power Point, Forms, Outlook, etc.);
5. E-book system (based on Pressbook), which is tightly integrated with Moodle via LTI;
6. For asynchronous learning it is possible to use both Moodle Mobile App, ie. Use of the native "Oppia Mobile" application, also shown in the diagram below;
7. Finally, the evaluation and testing platform TAO, which integrates closely with Moodle via LTI.

Below, illustration 2.1 describes the teaching-learning platform: its components and the links between them.

Illustration 2.1: synchronous and asynchronous learning system design



Note: Logoes used in original scheme are the trade marks of respective companies

I.6 Necessary competencies for distant and blended learning format

The effectiveness of distance and blended learning is significantly determined by the quality of teaching by the instructor (quality teaching), because the general and subject competencies of the teacher have been around for a long time in the case of face-to-face teaching (see relevant standards), this report identifies only the competencies needed for online teaching, which are divided into five categories:

1. Professional duties;
2. Mixed type of pedagogy, technologies, instrument.
3. Engagement of participants and establishment of online collaboration;
4. Skills for effective communication;
5. Skills for participants organization and management in virtual classroom.

Their classification is based primarily on the updated North American Council for Online Learning (iNACOL, 2020) standards, which once formed the basis of the Teacher and Principal Professional Development Project (TEEP) online vocational training component (Burns, 2013).

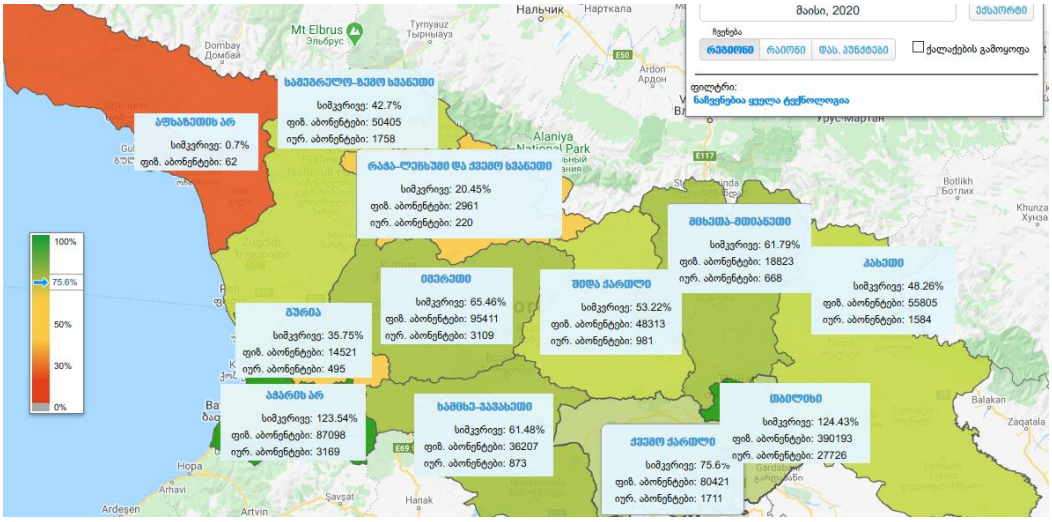
II: Readiness for distance and blended learning -teaching (analyses of existing situation)

As of May 2020, 91.8% of the 805,643 broadband Internet subscribers in Georgia were served by two major providers, MagtiCom and Silknet, out of which 55.7% - is MagtiCom (449,358 subscribers), and 36.1% - is Silknet (290,769 subscribers). Out of this, MagtiCom served 436,613 individuals and 12,745 legal entities, and Silknet - 272'551 individuals and 18,218 legal entities.

As can be seen from the illustration below, the coverage densities by regions (defined as the number of individual subscribers corresponding to the number of households / families or residents in a country divided) are quite unequal.

Illustration 4: Internet coverage densities*[1] by the regions

[1] *Note: Density is defined as comparison of individuals abonents with households of the country or total population of the country.



Source: National communication commission (2020)

https://analytics.comcom.ge:443/ka/statistics/?c=internet&f=subscribers&exp=companies&sid=806045

The lowest coverage rates are in Racha-Lechkhumi and Kvemo Svaneti, where the density is only 20.5% - only 3,181 subscribers (2,961 individuals) are registered in the region. Two territorial units, Tbilisi (124.4%) and Adjara (123.5%), have a high coverage rate. The density in these regions exceeds 100%, indicating that the number of subscribers exceeds the number of households. Together with these two territorial units, more than 50% coverage is observed in only the following four regions: Kvemo Kartli (75.6%), Imereti (65.5%), Mtskheta Tianeti (61.79%) and Shida Kartli (53 , 2%).

Accordingly, an imbalance in terms of internet coverage density at the country level is also noted in the district section (see section 3.1 of the report for details).

II.1 Data on digital devices ("books") purchased by the state in recent years and handed over to first graders.

The density of internet coverage is an important indicator that also reflects the potential of the country. Nevertheless, a direct indicator of distance learning readiness is the availability of digital devices and (through them) Internet access in schools and families (by students and teachers).

Since 2011, **the state has been implementing the program "My First Computer", under which all first-graders in public schools will be given a portable digital device Netbook ("Book"). Within the framework of the program, for the 2019-2020 academic year, LEPL "Educational and Scientific Infrastructure**

Development Agency" purchased a total of 55,000 netbooks for first-year pupils and their tutors on the basis of an electronic tender.

For comparison, the amount of computer equipment purchased and distributed by the agency in the 2018-2019 academic year was almost the same (55,050 pieces), while for the 2017-2018 academic year 53'700 pieces of netbooks were purchased. It should be noted, however, that some of the technical features of laptops purchased and distributed for the 2019-2010 academic year, such as computer RAM and hard drive capacity, were twice as good as in previous years.

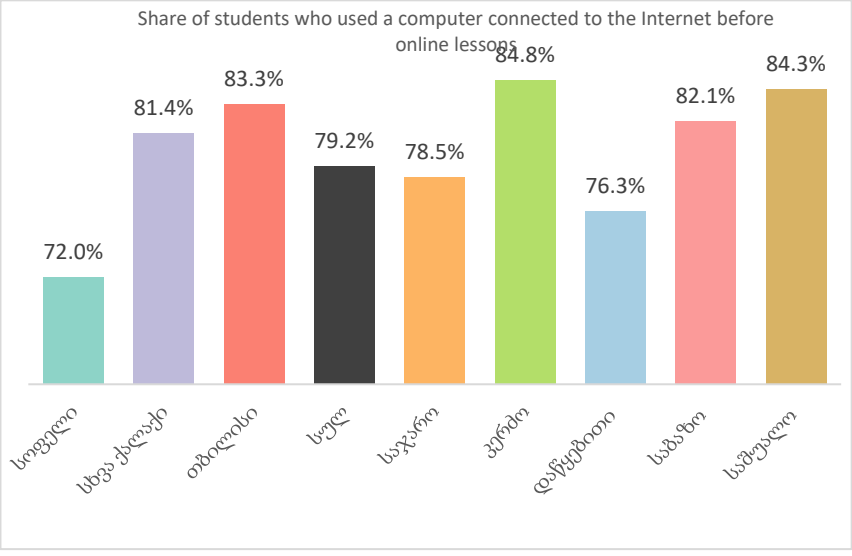
Finally, according to the LEPL "Agency for Development of Educational and Scientific Infrastructure", in recent years, the number of damaged netbooks has averaged 1.5% per year.

II.2 Access to Internet and Digital Devices

According to a survey conducted by the Education Management Information System in March 2020, 528,426 pupils were enrolled in the general education system, of which 12% (63,272 students) did not have access to the Internet from home, and 14% (71,796 students) did not have computer device. This last figure can be explained to some extent by considering the annual (percentage) failure rate of netbooks. One part of the other students had access to both fixed and mobile internet. Overall, out of these two overlapping groups, 88% of students had fixed internet access and 53% had mobile internet access.

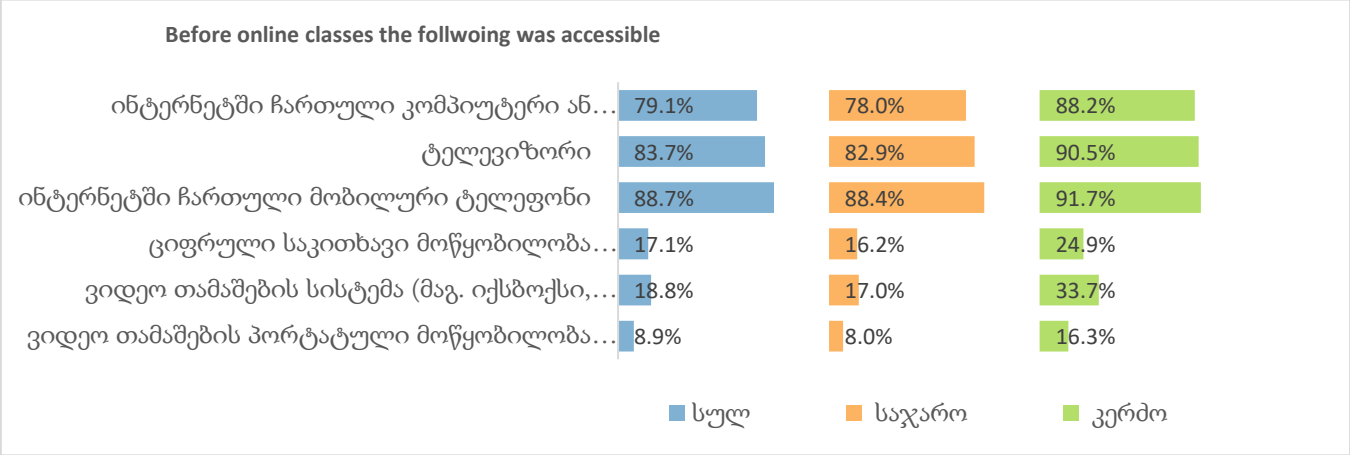
These figures are in good agreement with the study from LEPL "National Center for Assessment and Examinations" conducted in the first half of June 2020 - "Distance Learning-Teaching Survey" data (see section 3.4 below for details). The findings of this recent study show that before the COVID-19 pandemic, 79.2% of the students surveyed used the Internet (at home or at school). Their distribution by different categories is given in Figure 3.5.

Illustration 3.5: Share of students who used a computer connected to the Internet before online lessons



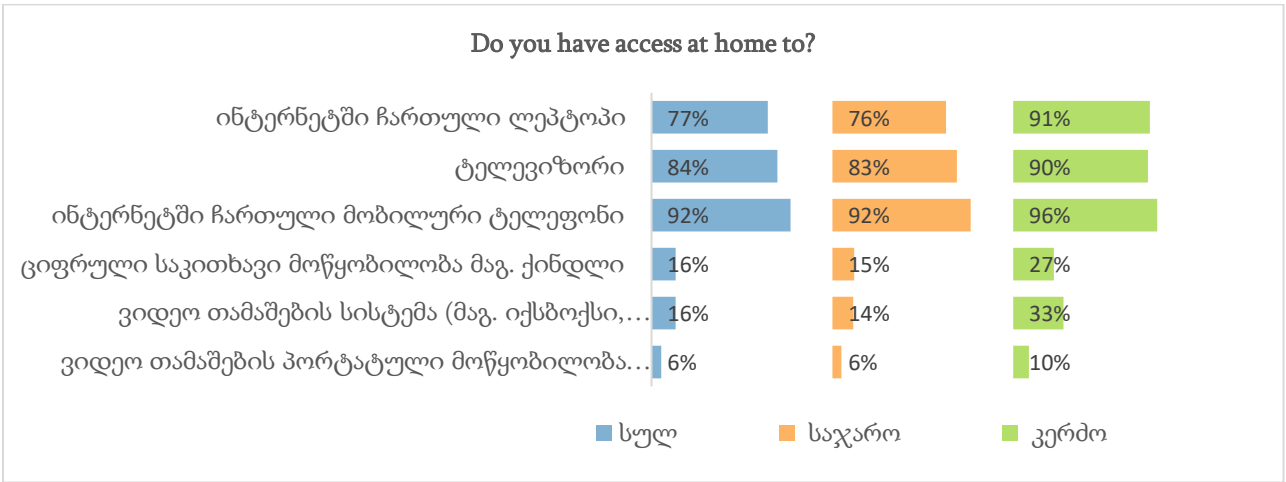
Source: LEPL "National Center for Assessment and Examination"

In addition, 69.1% of rural students had access to a computer or laptop connected to the Internet; In the case of students living in the city, this number exceeds 82%.



Source: LEPL "National Center for Assessment and Examination"

The data collected through student questionnaires more or less respond well to the answers of their parents, according to which 64% of students in rural areas had a laptop or computer connected to the Internet.



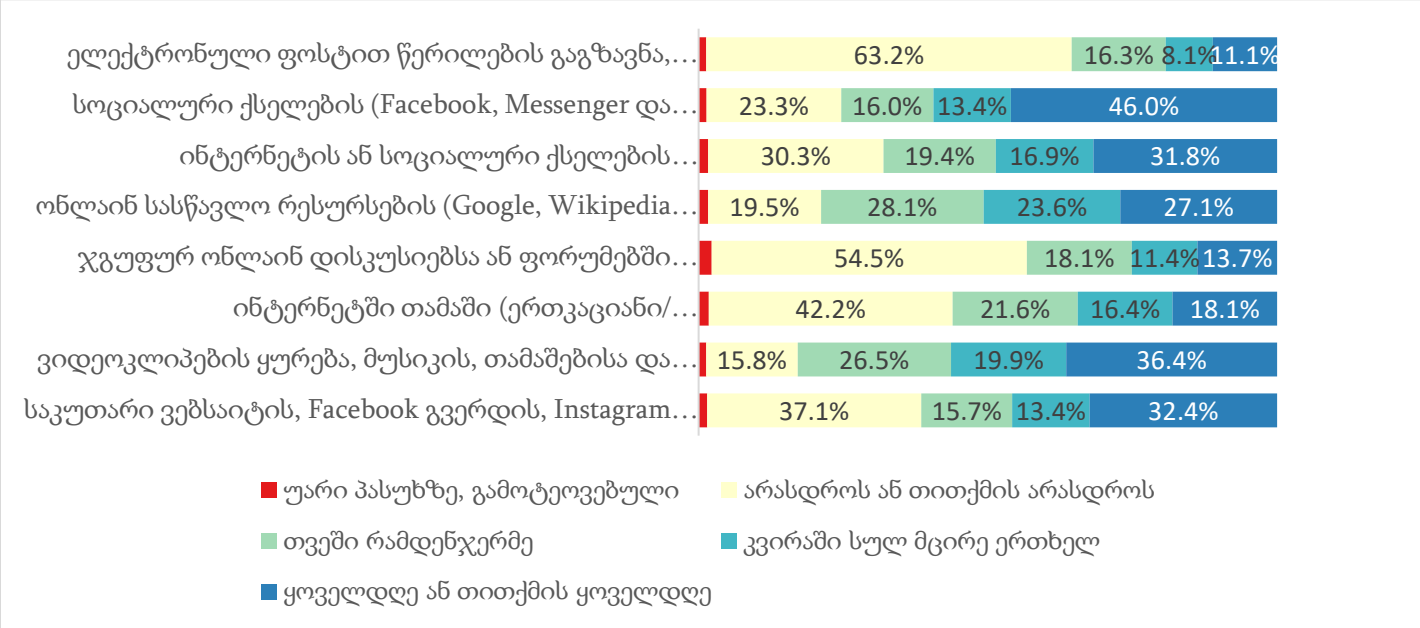
Source: LEPL "National Center for Assessment and Examination"

Detailed information on Internet access and digital devices in schools and their quality is given in Section 3.3 of the report. Here we only note that according to PISA 2018, there is no (statistically) significant difference between students with different social statuses in terms of access to these resources.

II.3 Use of ICT by the pupils

Prior to the COVID-19 pandemic, a study conducted by the LEPL National Center for Assessment and Examinations provides information on the frequency and purpose of Internet and ICT use by pupils (see section 3.6 for details):

- Prior to the pandemic, the Internet was mostly used for homework by the students in urban schools;
- For the same purpose, pupils of the non-Georgian sector used the Internet relatively less;
- It was most difficult to use it for this purpose in Samegrelo-Zemo Svaneti and Racha-Lechkhumi - Kvemo Svaneti.



Source: LEPL "National Center for Assessment and Examination"

As for students' use of the Internet for other purposes:

- The Internet was mainly used by primary and secondary school students;
- Prior to the pandemic, students mostly used the Internet in Tbilisi;
- Internet was less used in non-Georgian sectors;

- Internet was less used in Shida Kartli, Kvemo Kartli, Samtskhe-Javakheti, Kakheti and Guria.

II.4 Teacher's general, subject and ICT competencies

According to the National Center for Teacher Professional Development, teachers have received ICT training in the last six years through various modules.

Table 1: Number of teachers, who passed various trainings in ICT in 2014-2019 years

Years	Basic course in Information-Communication technologies	Use of Information- communication Technologies in teaching process	INTEL basic course – project based teaching and integration of information – communication technologies	1:1 el - learning	Flipped classroom	Short Training courses (edmodo, Googe earth etc.)	General course in information – communication technologies for practiocioner teachers	Use of services from Microsoft Office 365	Teaching digital ciitizenship	Scratch- visual programming -new module that was only piloted
2019			605			511	403	1103	721	16
2018		1942	2330			812	125			
2017	918	1621	2594	528	1261	589	119			
2016	1733	1888	4353		1914	463	242			
2015	1362	1463	4374	400	1218	357	278			
2014	2732	2437	6076	2178	4590	753				

Source: LEPL "National Center for Assessment and Examination"

As for professional training in general and subject competencies, during 2016-2019, with the support of the Millennium Challenge Corporation - Georgia, the National Center for Teacher Professional Development implemented the "Professional Development Project for Teachers and School Principals". Within the the program, up to 18,300 current teachers of the 7-12 grades of so called STEM subjects (Chemistry, Physics, Biology, Mathematics, English and Geography) passed the professional training

and principals of all public schools. In addition, the TEEx online learning platform was piloted at the end of the project: up to 600 teachers took online course in general professional skills,

Table 2: Number of users (teacher seekers) registered on the TEEx platform per professional development courses.

#	Ongoing course	Registered on course and attends
1	Characteristics of a student-centered learning environment	1560
2	Student-centered learning environment - teaching and assessment strategies	1382
3	Positive management of the learning process and readiness for professional development	1179
4	Demonstration course	1901
5	Open course - introduction in teacher's profession	1609

Source: LEPL "National Center for Assessment and Examination"

Finally, according to the National Center for Teacher Professional Development, from September 2020, training for practicioner teachers is planned to be renewed on the basis of the TEEx platform: up to 4,000 practicioner teachers will take online courses.

The growth of trainings in STEM subjects for the last five years is also confirmed by the data of TALIS 2018. The table below shows the percentage of teachers who have undergone any professional development activity.

Table 3:% of teachers who have undergone any professional development activity.

Subject group to which the subject belongs that is taught by the study participant	Participation in any professional development activity (%)	Standard mistake
Mathematics	97.7%	0.92%

Modern foreign languages (apart from the teaching language)	95.42%	1.34%
Natural sciences	94.92%	1.7%
Social sciences (geography among)	94.39%	1.7%
Art	92.54%	2.07%
State/ teaching language and literature	92.29%	1.77%
Technologies (Information technologies among)	86.82%	8.92%
Sport	83.6%	3.75%

Source: TALIS 2018 year data

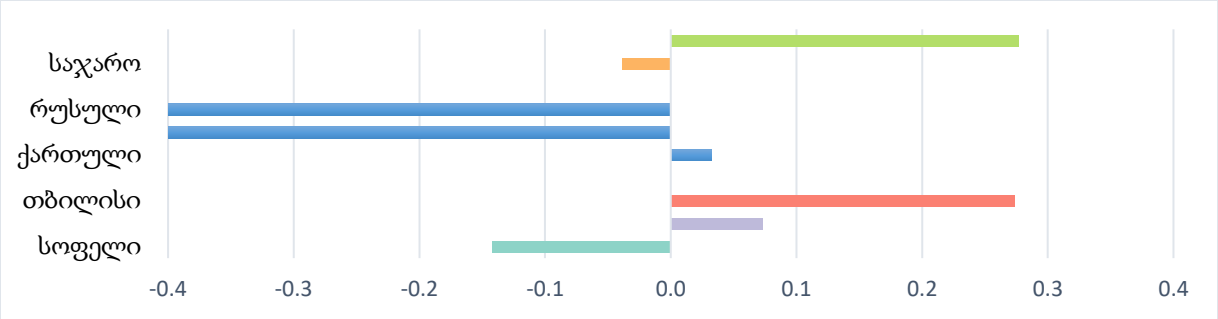
Regarding the competencies of teachers, it should be noted that according to the data collected within PISA 2018, the percentage of spupils whose school principal partially or fully agrees with the following statement is quite high:

- Teachers have the necessary ICT and pedagogical competencies to integrate ICT tools in the teaching-learning process (75%);
- Teachers have enough time to prepare integrated lessons based on ICT tools (83%);
- Teachers have access to effective professional resources to use digital media in their teaching process (86%);
- Teachers are given an incentive (incentive) to integrate digital media into the teaching process (73%);
- The school has sufficient experienced technical support staff (87%).

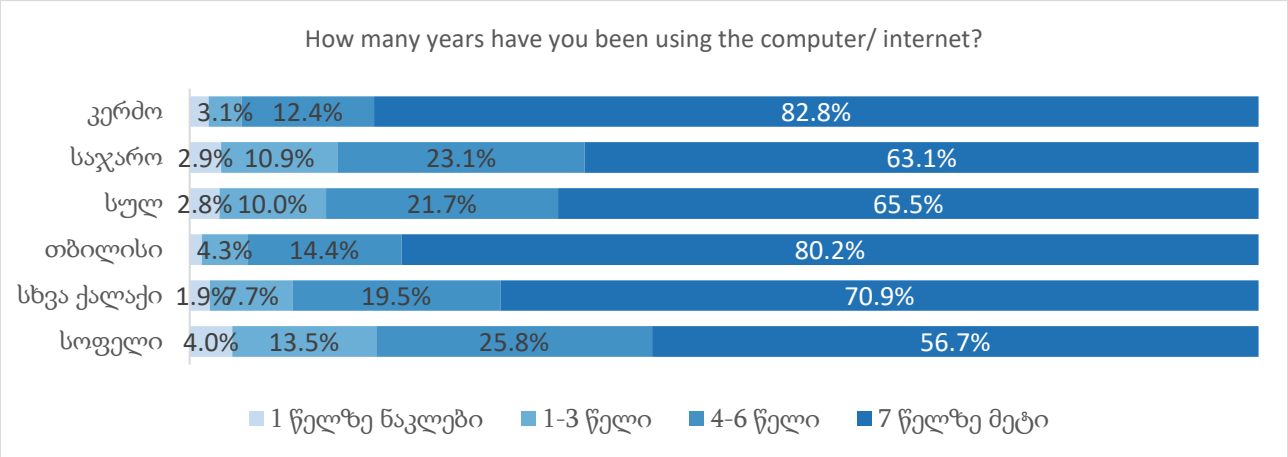
(Note: At the end of each statement, the percentage of students whose principal agrees with the statement, is indicated).

Before the pandemic, interesting information on the frequency and purpose of Internet and computer use by teachers is provided by the "Distance Learning Survey 2020" conducted by the LEPL "National Center for Assessment and Examinations" in the first half of June.

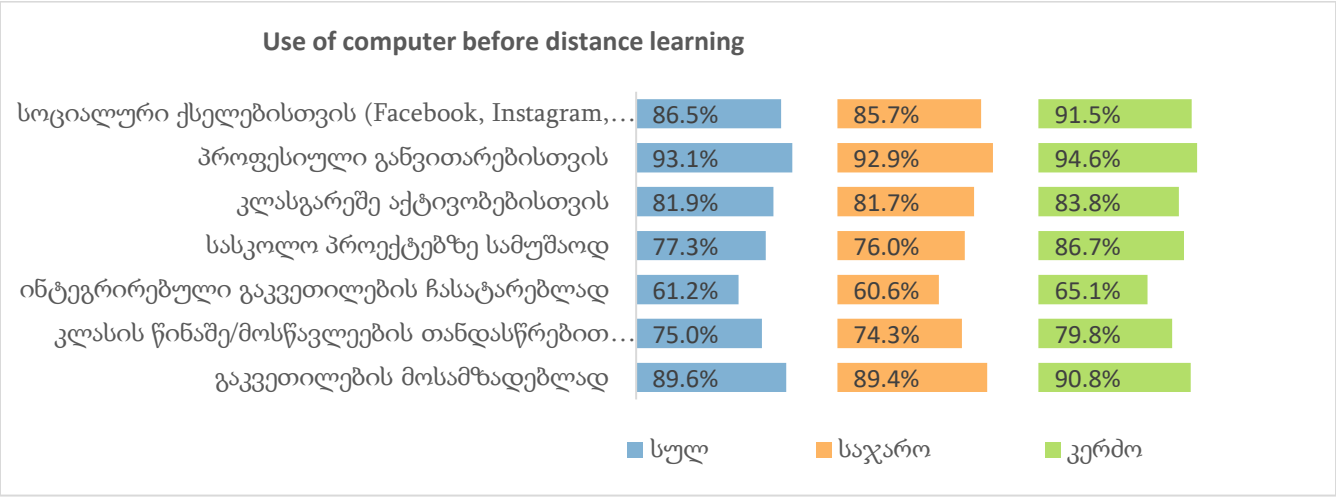
- Skills of teachers to use ICT in the teaching process are high in Tbilisi;
- ICT skills of private school teachers are high compared to public school teachers;
- The competence of teachers in the non-Georgian sector in the field of ICT is low;
- Teacher competencies in ICT are low in Kvemo Kartli, Samtskhe-Javakheti, Racha-Lechkhumi- Kvemo Svaneti, Mtskheta-Mtianeti, Guria and Adjara.



65,5% of teachers use computer more than 7 years.



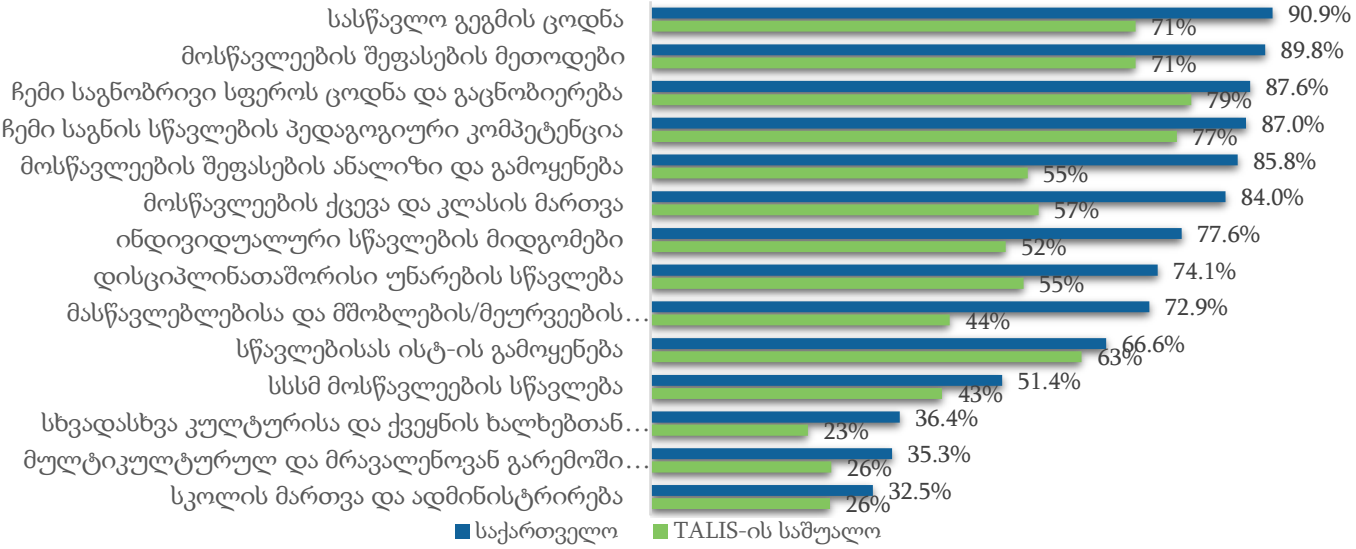
However, before distance learning, teachers mainly used computers to prepare lessons.



II.5 Teachers professional development activities per topics

According to TALIS 2018, the professional development activities in which teachers participated were focused on a variety of topics. Their content includes activities aimed at increasing subject competence, as well as activities focused on the development of methodological content and pedagogical skills, such as student assessment and assessment analysis, differentiated teaching, integrated teaching, use of information and communication technologies, classroom management, etc.

Ullustration 7: Contextual directions of professional development



Source: TALIS 2018.

The activity of Georgian teachers in terms of participation in professional development events is quite high compared to other countries. On average, a Georgian teacher engages in more than 4 different professional activities during his / her career and covers different topics on the path of professional development. In terms of topics, the highest rate is in the content events called "Student Behavior and Classroom Management", in which Georgia is in the 2nd place among 49 participants. Also noteworthy, Georgia's 3rd place in the type of events, which are commonly called "Communication with peoples of different cultures and countries" and the 4th place in content activities such as "Student Assessment Methods", "Student Assessment Analysis and Use" and "Individual Teaching Approaches" ". Relatively low, but not so bad is the 16th place in activities such as "Teaching students with special educational needs" and the **20th place in terms of professional development activities such as "Use of information and communication technologies in teaching".**

II.6 Professional development needs

According to the data of TALIS 2018, among the surveyed teachers, the most relevant is the professional development in the field of "Skills in the use of ICT (information and communication technologies) in teaching the subject." Up to 33% of the surveyed teachers mention the need for activities in this direction. There is almost the same demand for activities related to student assessment and curriculum knowledge.

Table 4: Teachers professional development needs

Type of activity for professional development	Percentage	TALIS-average
Skills to use ICT (information and communication technologies) in teaching the subject	32.8%	20%
Analysis and application of student assessment	25.7%	13.2%
Student assessment methods	25.3%	14.3%
Curriculum knowledge	25.2%	16.1%
Collaboration between teachers and parents / guardians	23.3%	12.6%
Teaching students with special educational needs	22.0%	23.9%
Pedagogical competencies for teaching my subject (s)	21.9%	12.8%
Individual teaching approaches	21.5%	15.1%
Student behavior and classroom management	21.4%	16.2%
Knowledge and understanding of my subject area	21.1%	11.8%
Teaching interdisciplinary skills (eg, creative thinking, critical thinking, problem solving)	20.1%	16.1%
Communicating with people from different cultures and countries	17.3%	13.4%
Teaching in a multicultural and multilingual environment	12.4%	16.4%
School management and administration	10.7%	9.2%

Source: TALIS 2018.

As we can see from the table, the share of teachers who believe that they need professional development in terms of knowledge of the subject and increase of interdisciplinary competencies is

not so high. The share of teachers who consider it necessary to develop their competencies in the direction of teaching in a multicultural and multilingual environment or in the areas of school management and administration is very low.

Goals of the survey, its objectives, design and methodology

Goals and objectives of the study

- Identify the needs of participants and key beneficiaries engaged in successful delivery of education services distantly or blended in the peridos of COVID-19 pandemic and afterwards.
    - Comparative analysis of required / necessary and existing competencies for key participants in the education process through these new forms (students, teachers and school administration);
    - Existing and additional resources available in the family and in education system (at school, regional and country level);
    - Identify systemic problems in effectively managing the distance learning process, teaching-learning quality management and assessment.
    - Identify effective approaches to quality management of the teaching-learning process and the technical solutions required for their implementation - e.g. the so-called under the conditions of a hybrid, partially decentralized model - open source and free distributed systems for 'big data' collection, time-repeated research and analysis; open code and free of charge systems;
    - Recommended solutions at the level of education policy (for example, distance education requires the development and use of adapted curricula, assessment and hourly grid, differentiation and diversification of distance learning approaches according to the abilities of students in general education levels, etc.).

Survey qeustions

Below are given general and sub questions:

- **What is the readiness of the country for distance / online and blended learning?**
    - subQ1: What are the requirements of these new forms of education processes for its key participants: teaching-learning processes for teachers and students, and management and monitoring of these processes for school administration?
    - subQ2: What is the readiness of students and teachers of different levels to participate in new forms of teaching-learning processes: What relevant competencies do they have for effective participation in these processes, both in terms of subject and general, as well as ICT skills?

- subQ3: What resources are available to implement the teaching-learning process in the new environment: at home, at school and at the country level? (Including in the context of the problems of the high mountiniuos, the border, the occupation line and ethnic minorities, as well as the social background?) In addition, what is needed to develop and create at the system and local level? Which regulations are not compatible with this process, which need to change / adapt?
- o SubQ4: What ways and approaches are there to effectively manage and monitor the quality of education in remote and mixed formats?

Survey design and methodology

Based on the research objectives described above, the design and methodology of the research is based on a unified, holistic vision, according to which the student is at the center of the online / distance education process in any form. According to the modern constructivist educational concept and principles focused on personality development, students are given an active role in creating their own knowledge. These principles are becoming even more relevant in the case of online education - for pupils (along with ICT and reading competencies), the development of independent learning, metacognition and self-regulation skills is the basis for online education in the subject areas. However, one of the preconditions for knowledge construction is effective social interaction with peers and teachers, cooperation with them. Students cannot be alone in these processes, especially during online learning. They need the help of a teacher who should be able to: "turn the classroom upside down" and effectively facilitate the learning process in a new environment using appropriate tools. As many international studies show, the various factors influencing student achievement, quality teaching plays a crucial role. For example, findings from the Organization for Economic Co-operation and Development (OECD) International Student Assessment Program (PISA) show that "the quality of an education system cannot exceed the quality of a teacher [teaching] ... because student learning is ultimately a product of the classroom and visa versa, the quality of teaching can not exceed the quality of organizing teachers' activities, professional development [opportunities] and their support at the school level and assistance to schools [from the state] "(OECD, 2012, p. 3). Finally, readiness for education in new forms, especially in the face of the COVID-19 pandemic challenges, implies the existence of a flexible general education and teacher professional development policy; Effective approaches to monitoring and managing the quality of education, and timely, targeted interventions to ensure their successful implementation, both at the school and system level (human and educational) and in providing resources and infrastructure.

Conceptual framework of survey

According to the goals and methodology of the research, the focus of the research is on the study of the factors that influence the achievements and attitudes of students both individually (personally) and contextually.

Individual factors are divided into two categories: cognitive and affective (emotional) (eg academic and social "I-concept", self-efficacy, perception of learning importance, learning interest and intrinsic motivation, avoidance of learning, metacognition - cognitive and emotional self-learning and learning behavior, pupils stereotypes about their own skills and abilities). Accordingly, in this study, we examine the following constructs and interactions during the individual level (first level) analysis:

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1. Students' subject competencies: their achievements in the three main cognitive areas of teaching (reading, mathematics and natural sciences);
2. General competencies of students: independent learning skills, cognitive and emotional self-regulation and their impact on student achievement;
3. Competences of students 'ICT and their impact on students' achievements in three main cognitive areas;
4. Attitudes towards student learning and their impact on student achievement in cognitive areas; (Note: "Attitudes" is a large construct consisting of the following affective factors: perception of the importance of learning, interest and motivation, stereotypes and avoidance);
5. Evaluate the effectiveness of distance / online learning during the last quarter of the academic year 2020 and attitudes towards it;

On the other hand, the development of the student is essentially conditioned by his interaction with the surrounding, contextual environment. However, this contextual environment is multilevel (or layers); We consider the connections between its levels in the context of a complex system consisting of five consecutive subsystems (Bronfenbrenner, 2009): These subsystems are:

- **Microsystem** - Instant pupil's environment (family, living environment). The research considers the following factors in this area: student social status, gender, ethnicity (majority, minority), language of instruction, family educational resources, including access to the Internet and digital devices, and learning space at home.
- **Mesosystem (interpersonal)** - connection between microsystems. The research focuses on the following factors at this level: students' (physical and online) classroom perception of teacher activities, classroom discipline and the psycho-emotional environment (climate) in the classroom; A sense of belonging to the student's class and school; Teacher general, subject and ICT competencies, education, certification and status; Evaluation of own professional activities (including online training and communication with parents); Assess discipline and the existing climate in own classroom; Teachers' expectations and attitudes, attitudes and needs towards online learning, including in terms of resources and professional development;
- **Exosystem (organizational)** - larger social organizations (school). Among the factors in this field, the focus of the research is on the following factors: school location (region, village, district, small town, village), school size (large, medium and small), type (public, private); Assess existing practices and policies (including ICT teaching) by the school administration to monitor their own competencies, roles and activities, school education processes, their quality; Assess school infrastructure and available resources and needs (including educational and human resources, access to the Internet and digital devices); Communication with students, teachers and parents; and parental involvement in school.
- **Macrosystem (society)** - cultural values and social norms, values in society. In the framework of the research, we consider only the following factors from this environment: the attitudes of parents, teachers and school principals towards teaching and specifically online learning, their expectations, stereotypes etc.
- **Education policy** - it can have a cascading effect when interacting with all other subsystems. The study considers the following factors in this component: the role and place of online / distance and blended education in existing general education and teacher professional development policies; Existing regulations for conducting, monitoring and managing education processes in these new forms and the need to update existing policies and regulations. (For example, adapting national curricula for distance and online education, classroom and school assessments, adaptation of hourly grids; creating regulations for creating new educational resources in digital format, purchasing and consuming permits for their licensing; Updating the process monitoring and quality control on the school and national level; update of teacher professional development and career advancement scheme).