REPUBLIC OF CROATIA
Ministry of Science and Education

ACTION PLAN FOR THE IMPLEMENTATION OF THE DISTANCE EDUCATION

Distance education model

A PROPOSAL

June 10, 2020

Ministry of Science and Education of the Republic of Croatia
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INTRODUCTION

This document was created during the actual implementation of distance education in the Republic of Croatia from March to June 2020. The original purpose of this process was documenting the most important steps and procedures that had been implemented during the spring of 2020 in the successful operation of distance education in schools and higher education institutions. The process of documenting was meant to be a preparation and a plan so that, if necessary, similar or improved approaches could be used in the following years in schools and institutions of higher education. Furthermore, probable scenarios for the next school year and academic year have been prepared based on national and international analyses, as well as the most important activities and projects in order to handle each of the mentioned scenarios successfully.

The document can be divided into two parts: a view on the past and a perspective for the future. In the first part of the document, there are basic steps in preparation and implementation of the project implementation from March to September 2020. The second part of the document contains the detailed scenarios for distance education for the next school year and academic year with appropriate models of distance education. The development and adoption of Models of distance education, as an activity and a result, was foreseen in the National plan of reforms of the Government of the Republic of Croatia for the year 2020 with the deadline for completion in September 2020.

The successful project of distance education in Croatia is the result of efficient strategic planning and a substantial effort put in by primary and secondary school teachers, expert associates, as well as leaders of institutions in the educational system. Students and their parents have also made the best of the given opportunities, and practically implemented and innovated processes that were planned on a strategic level.

During the transition to distance education and the implementation of this type of education, there was no methodology to uphold, nor examples of best practice to learn from, especially for pre-tertiary level of education (primary and secondary schools). Therefore, the document *Action plan (AP)* is a unique document in which this process has been described and analyzed, but which also provides solutions to moderate risks for the future period as well as the digital transformation of the system for improving the quality of education on all levels.

WHAT MADE DISTANCE EDUCATION IN CROATIA POSSIBLE?

Croatia started the curricular reform of education in 2016, and since 2017, the reform has been particularly focused on improving digital competences of students, primary and secondary school teachers, expert associates, and school principals, as well as on equipping schools.

As early as 2017 we started a project of incorporating digital literacy into various subjects and after-school programmes by using microcomputers. In cooperation with the Institute for the Development and Youth Innovation, the Croatian Academic and Research Network (CARNET) acquired 45,000 microcomputers for 6th grade primary school students with the aim of developing students' digital competences, fostering creativity, innovation and an interdisciplinary approach to the use of information technologies.

Furthermore, Information Technology was introduced in 2018 as a compulsory subject in 5th and 6th grades of primary school, and all the curricula of Information Technology in primary and secondary schools have been reformed. From the school year 2020/2021, all primary schools have to provide Information Techology as an elective subject from 1st to 4th grade. In order to prepare for the introduction of the new subject, additional teachers were hired, specialized classrooms were equipped and teachers were trained to implement new subject curricula focused on computational thinking and programming, but also internet security, as well as participation in e-society.

Additionally, in 2018 the regulations on textbooks were changed to provide for budgetary funding for digitalizing textbooks and learning materials.

In 2015 CARNET (Croatian Academic and Research Network), launched the pilot phase of the e-Schools project, equipping 150 schools, and developing various digital educational content. All primary and secondary schools will participate in the continuation of the implementation of the project in the Republic of Croatia. Additional equipment for teachers and schools will be procured, as well as new information systems accompanied by appropriate training.

An important technical prerequisite was the introduction and the development of unique digital identity (AAI@EduHr) in the past few years for all employees, student in primary and secondary schools, as well as higher education institutions, and the implementation of the electronic grade book.

In implementing digitalization, the priority of the Ministry of Science and Education (MoE) was to ensure digital independence of teachers, which meant ensuring that teachers have laptops and that classrooms were equipped with overhead projectors or interactive/smart whiteboards allowing various types of content and multimedia to be used in all classes. Therefore, in the year 2019, 1,269 laptops were procured within the project of Comprehensive Curricular Reform (CCR II) for expert associates, and 26,755 laptops for teachers as part of the project e-Schools. Projectors and smartboards were bought for classrooms that lacked them.

After that we focused on equipping students within the framework of the Comprehensive Curricular Reform project (CCR I and CCR II), funded by the EU. The plan was to digitalize schools, with adjustments being made regarding the age of students, and in accordance with data collected from experimental schools and international sources. This implied that students in lower grades (from 6 to 10 years of age), who need to develop graphomotor skills, should use tablets only in activities such as group

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work, so four or five tablets have been provided in each class. In higher grades, when students attend subject classes (from 11 to 15 years of age), the principal should ensure the provision of a tablet for each student, encouraging the use of digital content and materials, and providing students with an opportunity to learn how to use the digital tools in a responsible way. So far, tablets have been bought for all students in 5th and 7th grade of primary school (91,641 tablet), and 10,000 tablets for students attending lower grades of primary school (class teaching) to use under the supervision of their class teacher.

In secondary schools, equipment was provided only to students with lower socio-economic backgrounds, as the research in the experimental phase of the curricular reform showed that the majority of secondary school students already own equipment with Internet access.

In Croatia, primary education is compulsory and the emphasis is put on equal access to the primary level of education. The challenge was to provide all students with Internet access at home, enabling them to access digital content. Mobile network operators joined the initiative by providing all students who received tablets with SIM cards enabling free access to digital educational content and additional 2.5 GB of Internet traffic per month (some even 5 GB weekly).

Along with tablets, a Mobile Device Management (MDM) system was bought that connects the tablets and enables centralized control over the devices. The system monitors tablet usage and enables centralized installation of software.

Strong emphasis was put on developing teachers' digital competences and facilitating their work in a virtual environment. Teacher training for curricular reform was launched online in 2018, via virtual classrooms on the Moodle platform (Loomen). This enabled continuous professional development and online cooperation for teachers. In almost two years, more than 50,000 teachers participated in such training. This was the key experience that later enabled teachers to establish virtual classrooms and communicate with students and other teachers without difficulty. All those virtual classrooms are now used as a support network for teachers and for sharing learning resources, ideas and information as well as for direct communication with MoE. This training and support was provided by teams of mentors established in 2017 and have continuously been preparing and organizing trainings and support as part of the educational reform. All of this contributed to the swift and effective distance learning implementation in the context of the COVID 19 crisis.

IMPLEMENTING DISTANCE EDUCATION IN TWO WEEKS

When school closure was announced at the beginning of March 2020, as a potential measure in different countries all over the world, MoE started preparing for distance education. It took two weeks to make a detailed strategy and operative preparation, which enabled all classes to start being implemented online, and distance education was successfully launched on 16th March 2020.

The preparatory coordination was managed by MoE, and other institutions that participated in their full capacity were Croatian Academic and Research Network (CARNET), University Computing Centre (SRCE), Education and Teacher Training Agency (ETTA), Agency for Vocational Education and Training and Adult Education (AVETAE), and Agency for Mobility and EU Programmes (AMEUP). MoE invited the representatives of the National Centre for External Evaluation of Education (NCEEE), but they did not participate in the initial stages. Meetings, preparations, testing and coordination were intensive and demanding in terms of expertise and time.

Finally, we developed a viable concept and agreed upon practical and feasible solutions, so that by 16th March digital content was already developed (video lessons and TV programmes), as well as the broad technical and support system (helpdesks at MoE, CARNET, and SRCE).

The concept of distance learning was based on two key principles:

1. **Access to education needs to be provided for all students, with the level of digitalization adjusted to age,**

2. **Every solution needs to have an additional backup plan, and the possibility of monitoring distance learning.**

The priority was to create the content needed to launch distance learning so that teachers would have the time to establish the communication infrastructure and adapt to online teaching.

For students attending lower grades of primary school, MoE decided to establish a cooperation with the public television because this age group is too young to use digital technology independently. The teachers needed to establish communication channels with the parents rather than the students, and for this, they were encouraged to use social networks and chat groups that parents could access via their smartphones. *School on Channel 3* soon became synonymous for distance education for very young students. The teachers who participated in the realization of *School on Channel 3* were supported by many teachers and students who created scenarios in a virtual environment, assignments for exercise, and interactive multimedia elements. The realization was also supported by well-known athletes who created short video lessons for physical education classes.

For older students (from 5th grade onwards), 15-minute videos were created following the centrally defined schedule aimed at enabling all students to achieve all learning outcomes planned in the curriculum by the end of the school year. Mentor teams (School for Life) immediately started creating video lessons and by 15th March, educational content for a whole week of learning had already been prepared for all 8 years of primary education, as well as for secondary education. The team was continually expanding, including teachers who were sending their video lessons.

Special attention was given to students of secondary school graduating class. We organized video lessons especially for these students in order to prepare them for the mandatory part of the secondary school graduation exam (*Matura*). The lessons were aired on Saturday mornings on channel RTL 2. In addition, this was the first time that we organized writing of an online essay in Croatian language which was taken by 11,500 students of secondary school graduating class.

Another priority was to provide the necessary equipment and Internet access to all students of subject teaching. Internet access was enabled through cooperation with all mobile network operators, and by using the funds in MoE's budget, additional timely investments were ensured.

Higher education institutions (HEI) also received guidelines for the transition to distance learning, while University Computing Centre (SRCE) provided software and support through its distance learning centre. HEIs have autonomy in determining how distance learning will be implemented in practice. During the first few weeks, HEIs on average needed more time to adjust to new circumstances than schools. The reason behind this was the way the process needed to be managed, since schools are more centralized than HEIs. In the transition to distance education, with its demands of quick and coordinated response, central coordination proved to be more efficient.

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Technical support to primary and secondary schools has been successfully provided by CARNET.

While preparing for distance education, MoE published instructions for schools (Instructions to Primary and Secondary Schools for the Organization of Distance Learning and Guidelines for Distance Learning for Primary and Secondary Schools) focusing on:

- establishing communication channels,

- appropriately equipping students of lower socio-economic backgrounds,

- providing instructions for the age-appropriate use of the prepared content,

- monitoring and support.

The structure of virtual communication channels and classes is shown in the next image. All principals were meeting in the virtual classroom on Loomen, and through this virtual classroom, they received all the necessary information from MoE. At the level of schools, each school needed to open a virtual teachers' room for all teachers and expert associates. For each class, a virtual classroom was established in which all students and their teachers logged in with their unique digital identities.
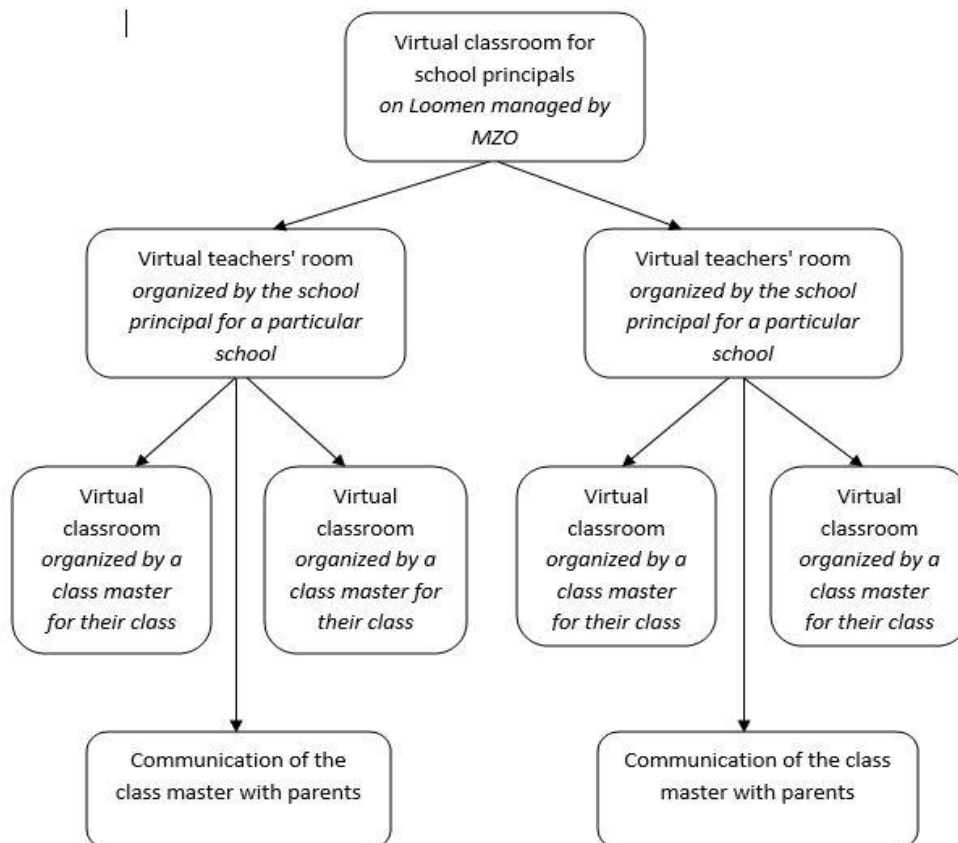
Support and information for teachers of primary and secondary schools, and principals were provided through several channels, which is shown on the following image:

Virtual classrooms for all principals led by MoE

Virtual classrooms for subject teachers led by MoE mentors in School for Life

Sharing information – webpage MoE

Sharing information – webpage School for Life

Sharing information – webpage CARNET

Heldesk CARNET-a

Helpdesk MoE

All mobile network operators in Croatia have provided free broadband internet and SIM cards for all students of primary and secondary schools, as well as university students with lower socio-economic background. Publishers and proprietors of educational applications have granted free access to educational content.

Guidelines and tutorials on how to organize virtual staffrooms and virtual classrooms were published on the School for Life website.

The day before school closure, the minister, Professor Blaženka Divjak Ph.D., provided all school principals with instructions and answered frequently asked questions in a public announcement (Address to Principals by Minister Blaženka Divjak).

The principle of always providing backup during the implementation of distance learning was implemented in several different ways using multiple channels for publishing and sharing information:

- Three TV channels: HRT3, SPTV, RTL2

- Several websites: MoE, School for Life, agencies' websites

- YouTube channels

- e-Mail

- Messaging apps

- Social networks

Recommended technical solutions:

- AAI@Edu.Hr nation-wide authentication protocol is used by all primary and secondary schools for all students and teachers.

- Different platforms accessible with AAI@Edu.Hr:

  - Moodle

  - Teams

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- Yammer
- Google classroom
- Edmodo
- Distributed set of systems, not *one* single platform – evenly distributing the load on the system

Centrally defined school schedule and video lessons for all 12 years of primary and secondary education are continuously published on School for Life website.

CRUCIAL GUIDELINES IN THE FIRST TWO WEEKS

From the first day of distance learning, direct communication to helpdesk was established, and various media were used to answer frequently asked questions and to provide guidelines to schools and HEIs.

In addition, questions frequently asked by schools, teachers, parents and students were answered in the following documents:

Internet Access and Devices

For distance learning to function, every student must have Internet access and an appropriate device at home. Since a certain number of students does not have Internet access at home due to socio-economic reasons, teleoperators have been providing SIM cards with free-of-charge access to educational content and an additional 2.5 GB of Internet traffic per month for all students who needed it. More than 90,000 tablets were distributed to students, and MoE provided schools with additional funds and equipment for students.

In 2019, 26,000 computers were procured for teachers. The computers were distributed in schools in October and November 2019. Additionally, principals were able to distribute computers located in their schools' IT classrooms to teachers. In case some teachers still do not have computers of their own, principals can contact MoE for funds to purchase computers.

Work of Employees During Distance Education

Since distance education began, during the first week from 16th March 2020, MoE had recommended that teachers spend at least part of their working hours in school, in order to help establish a functional system of distance education. This was possible because there were no epidemiological restrictions on movement at the time.

However, the situation had changed significantly after a few days, **and as of 19th March 2020 a majority of teachers have been working from home**.

Requirements for work from home defined how to work, how to contact employees, expected outcomes of work, equipment needed by the employees to work from their homes, etc. For teachers without personal equipment for working from home, or teachers lacking technical knowledge for implementing distance education, working on school premises had certain advantages, at least during the initial period.

Vocational Schools, Secondary School Graduates, Student Participation in Vocational Practice Subjects

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Vocational schools were facing the problem of the inability to implement certain parts of vocational programmes in the form of distance education. Implementing vocational practice subjects is especially problematic. **MoE has created online content for all general subjects taught in secondary schools.** This provided vocational education students with time for vocational practice subjects once they return to school. Moreover, vocational teachers were encouraged to develop creative teaching solutions for vocational practice subjects to be implemented online if possible. Additional resources for teachers are available on the website by the Agency for Vocational Education and Training and Adult Education.

Virtual Content and Organising Classes

The basic principle of distance education is that the content and the learning need to be accessible to all students, regardless of their conditions at home and support provided by teachers in the first week of distance education, when students were getting used to the new form of learning.

The *School on Channel 3* and online classes on two other channels, along with teaching and learning in virtual classrooms, ensures that all learning outcomes are achieved by the end of the school year. We are aware that some students have already achieved some of the learning outcomes, while some students are lagging behind, and it is the teachers' support that should make up for the differences in pace when it comes to achieving learning outcomes.

By the end of the first week of distance education, more than 50,000 virtual teachers' rooms and virtual classrooms were established, with the participation of 450,000 teachers and students. In addition to that, more than 70,000 higher education students used the systems provided by SRCE, and the number does not include other distance learning systems used by HEIs.

In the second week of distance education the emphasis was on psychological support to students (via phone and e-mail), but also on the current guidelines for other stakeholders in the system.

To prevent imbalances in the student workload, during the first two weeks of distance learning MoE published the document Recommendations for Organizing a Student's Workday in Distance Teaching and Learning, defining the appropriate workload for students of different ages in to help teachers plan teaching activities, but also to parents and guardians who needed to support students at home.

FIRST MONTH DEVELOPMENTS

MoE published the Guidelines for Assessment and Grading in a Virtual Environment and started evaluating various scenarios for the implementation of the national graduation exam for secondary school graduates (*Matura*).

The Guidelines are based on a paradigmatic shift in learning and teaching, which is manifested in the transition from memorizing facts to developing competences necessary for living successfully in the 21st century, such as critical thinking, problem solving and informed decision-making, development of creativity and innovativeness. The paradigmatic shift needs to be discernable in methods of assessment and grading as well. Such methods can successfully be implemented in the virtual environment of learning and teaching.

The Guidelines include advice and concrete examples and tools to be used in the virtual environment.

During the first month of distance education, a substantial amount of digital educational content has been produced. In the first four weeks, the national television broadcasted around 100 hours of educational content especially created and implemented by teachers for students attending lower primary education (aged between 7 and 10). More than 1,200 video lessons for all subjects and all grades were published in the first four weeks. By the end of the school year, this number has tripled.

All educational resources are free of charge and publicly available online (OER)

WHAT KIND OF FEEDBACK WAS COLLECTED?

Participation of all stakeholders in distance education planning, monitoring and evaluation is crucial.

Within the framework of improving the quality of distance education, MoE has conducted several online questionnaires. Initially, MoE launched an online questionnaire among primary and secondary education teachers to determine the status of distance education in everyday practice, as well as the immediate needs of teachers and students. After that, a questionnaire for school principals was conducted, which took on a form of a structured report on the status of schools and an evaluation of the need for improvements in the organization and managing the system during this period of distance education. A questionnaire constructed for HEIs was also implemented, and it dealt with topics specific for HEIs.

The questionnaire meant for teachers was open in virtual classrooms for a week, until 2nd April 2020, and was closed one day before the Guidelines for Assessment and Grading in a Virtual Environment were published.

Although this was convenient sampling, the results of the questionnaire can be useful as a marker for further work and the planning of distance education support. Teachers accessed the questionnaire using their unique digital identity, so access was denied to non-teaching staff. Everyone could fill out the questionnaire only once and the data was not linked to the individual (it was anonymous). The questionnaire was accessed by 4,139 teachers.

Nearly all teachers (95%) are entirely or mostly satisfied with the way distance education was being implemented. As many as 93% of teachers believe that they managed to do better in distance teaching than they had expected before the beginning of distance education. A vast majority of teachers (90%) think that their students coped well or mostly well with distance learning.

Teachers are mostly satisfied with the equipment that was available to them. The results are similar regarding the evaluation of provided support. Namely, 87% of teachers think that the support they get from CARNET and MoE is good. Teachers are very pleased with the fact that there are video lessons and television programmes that support learning and teaching.

Concerning student activity, opinions are divided on whether students in distance learning are more active than in school classrooms: 58% of teachers think that students are more active in school and 42% think that they are more active in distance learning. This type of learning requires more engagement on the part of teachers and providing a larger number of a variety of assignments in order to motivate students. Therefore, MoE has advised teachers to grade students' activity and solving tasks of higher complexity in all subjects.

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More details on future needs can be found here. Activities and support provided by middle management in MoE and by competent agencies, were planned on the basis of the results of the questionnaires, as well as numerous questions that were directed at helpdesks.

Regarding higher education, the results of MoE's questionnaire conducted with the HEIs in Croatia demonstrate that the majority of HEIs (80%) carry out their study programmes by using different digital tools. However, some modules are more challenging for distance education, in particular: clinical practice, work-based learning with employers or work in laboratories. MoE is asking for open access to all digital resources in higher education. According to reports given by HEIs themselves, again, the most challenging issue is student assessment. However, the majority of HEIs in Croatia has already set up assessment procedures for distance education or is in the process of doing so.

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HOW TO EVALUATE AND ASSESS IN DISTANCE LEARNING?

Since online classes began most of students' and teachers' questions were related to distance learning assessment and grading. There were also many questions regarding State Matura and mass exams at HEIs.

Thus, the Ministry and School for Life mentor team in cooperation with Education and Teacher Training Agency (ETTA) and Agency for Vocational Education and Training and Adult Education (AVETAE), created and published Guidelines for Distance Learning Assessment and Grading.

Guidelines are divided in three parts: Instructions for Distance Learning Assessment and Grading, Appendix A – Various Subjects Test Examples and Their Assessment in Distance Learning, and Appendix B – Digital Learning Assessment Tools.

Guidelines use the change in learning and teaching paradigm emphasized in curricular reform implementation trainings which pointed out the shift form factual knowledge to development of competences needed for successful life and work in 21st century, such as critical thinking, problem solving and informed decision making, creativity and innovation development. This change has to be reflected in assessment methods. Such assessments methods can also be successfully used in virtual surrounding and teaching environment.

Guidelines were intended to encompass all acceptable formal education assessment and grading methods in Croatia, in given circumstances, taking into account the technological conditions and estimated student and teacher competence level. They are primarily aimed at primary and secondary education but with slight adjustments could be used at universities, polytechnics and colleges as well as adult education institutions.

The document provides general, theoretical overview to relate pre-tertiary education curricular reform to tertiary education Bologna process, but also practical advice and clear instructions for assessment in schools.

HOW DO WE PLAN TO END 2019/2020 SCHOOL/ACADEMIC YEAR?

Given the significant improvements in epidemiological situation, 2019/2020 school year end is planned as follows:

1. Students younger than 11 years old (until grade 4) returned to school by mid-May, while students in upper primary classes continued in distance learning model. The first two weeks, form 11th – 22nd May, epidemiological measures were quite strict bringing only a small number of students (around 4 500 students) to schools. From the 25th May epidemiological situation significantly improved. Instructions were less restrictive and all lower primary education students were invited to school, resulting in a greater turnout form the very first day – 80% (around 125.000 students). Recommendations for Lower Primary Education Teaching Organization and Assessment and Grading Guidelines of 25th may 2020 can be found here. Following the Government's Decision a combined teaching model was introduced to include distance learning and classes in school classrooms. Considering that by 5th June the *School on Channel 3* stopped broadcasting, because all compulsory curriculum was dealt with, classes at school could no longer be related to *School on Channel 3*. Nonetheless, all digital materials can still be used.

2. Most secondary school students will finish this school year using distance learning model, except students who take practical exercises, final, supplementary and makeup exams at school. Where epidemiological recommendations allow, students can have professional practice at employers. Schools will hold additional classes for students who need to improve their negative grades in line with the Government's Ordinance facilitating vulnerable student groups moving to next grade.
3. State Matura will be held in June and beginning of July (form 8th June to 2nd July) in two parts; compulsory and optional subjects. State Matura administration conditions set one month before exam date, were changed in line with favourable epidemiological situation.
4. HE students will have most of their 2019/2020 academic year classes in distance learning, but are allowed to come back to HEI in mid-May for practical, lab, clinical and art exercises. They are also given the opportunity to take exams under certain conditions.

DISTANCE LEARNING AND UNDERREPRESENTATION OF VULNERABLE STUDENT GROUPS

High quality distance learning and vulnerable student group's underrepresentation are the greatest challenges for all countries during pandemics because there is no single uniform approach, and individualization is required. In mid-March when first steps towards distance learning introduction were taken, not all measures were set, although there was a considerable level of preparedness regarding equipment and education. Nonetheless, in cooperation with agencies, associations, HEI and international organizations support was established quite promptly.

DISTANCE LEARNING FOR SEN STUDENTS

Within curricular reform project in December 2019 education centres and schools educating SEN students received additional four million HRK for school equipment that may help schools implement curricula reform. Procurement of this equipment provided additional infrastructural support for centres and schools educating SEN students to implement distance learning. Also, the Ministry allowed centres to decide on equipment distribution among students since they are most familiar with student's needs and possibilities. This made it easier for them to set up a system and establish communication.

Key principles and means the Ministry used in distance learning for SEN students are the following:

1. All principles applied in teaching and working with SEN students in school, and included in current conventions, laws and bylaws, scientific and expert recommendations, are to be used in distance learning.

2. All current curricula, created to allow simple and applicable individualization, are to be used in distance learning.

3. All documents and teaching materials prepared and published by the Ministry, AVET, ETTA and NCEEE are to be used distance learning.

4. Student using distance learning finishes this school year according to programme/curriculum defined in the Decision on Appropriate Education Programme.

5. In line with student's programme/curriculum the teacher makes appropriate adjustments to teaching methods and/or contents, and to assessment or evaluation, regardless of the distance learning form used – TV, virtual classrooms or some other.

6. Teaching assistant is a person providing immediate support to students during learning process in tasks requiring communication, sensory and motor activity, in moving, taking food and beverage, maintaining hygiene needs, in daily curricular and extracurricular activities, in and outside classroom. Student support is provided based on a work programme developed according to each student's functional abilities and needs, as well as instructions from teaching and non-teaching staff and parents/guardians. Assistant teacher does not offer learning assistance. Teaching assistant's support is not the support provided by personal assistant to adults with disabilities. The support teaching assistant provides to a student is needed to enable equal opportunities to students with difficulties and is primarily required in inclusive environments where student is educated in regular schools, and rarely in special institutions in class i.e. group. In distance learning, where student takes class at his/her home, there are no teaching challenges found in a class or a group. Assistance needed for such, individualised class, is given by student's parent or guardian. Although the Ministry allowed for such as a support to be provided at student's home with parents' and assistant's consent, for health safety reasons regarding students and assistants, such consent was rarely signed.

7. Teaching and non-teaching staff have at their disposal a whole range of excellent manuals[1] for working with SEN students.

8. All experts professionally involved in providing support to students with difficulties, as well as parents, are well aware of the benefits assistive technology development and availability offer to students with difficulties in ensuring their equal participation in education.

For all students requiring assistive technologies, including the visually challenged, the Ministry provided and financed such a technology.

9. All general pedagogical principles are part of universal design and inclusive culture, appropriate to all students. Thus, for example, Recommendations on Distance Learning School Day Organization, as well as other materials published at https://skolazazivot.hr/ are also used for SEN students' distance learning. Guidelines for Distance Learning Assessment and Grading for primary and secondary school

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[1] Didactical and methodical adaptations to teaching of maths and science are available in CARNET's editorial. These adaptations were originally prepared for Teaching Scenarios for the Area of STEM, Maths, Biology, and Physics. Each scenario contains support protocols for SEN and gifted students (authors: Igrić, Stančić, Ivančić, Dumančić-Bakavić, 2017),

Digital educational contents, subjects Biology and Chemistry, 7th and 8th grade of primary education and 1st and 2nd grade of secondary education, created to help students learn independently, main contents always displayed as inclusive overview for each grade for all SEN students, while teachers have methodical manuals containing detailed procedure description available at CARNET's webpages (authors: Stančić and Matejčić, Ivančić and Bačani, Duhović, Kudek-Mirošević and Rešetar)

Manual available at ETTA's web pages, Adjustments to English language lessons. This material was created by English language teachers and expert associates of several primary schools in Zagreb.

Manual "Digital Technology in Supporting Special Education Needs" created for workshop on that subject held in school year 2017/2018, within E-Schools project "Establishing a System for Developing Digitally Mature Schools (pilot project), is available at CARNET's web pages.

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teachers, and partly parents/guardians and students, can also be used for SEN students, with the necessary individual adjustments and choice of methods and forms.

Key stakeholders[2], such as Education and Teacher Training Agency, Faculty of Education and Rehabilitation Sciences at University of Zagreb, Croatian Chamber of Educational Rehabilitators, Croatian Association of Sign Language Interpreters for the Deaf and UNICEF, offered schools support with SEN students and their activities.

The Ministry's crisis teams for psychological support were activated to provide support via phone and online to all students, teachers and parents needing help.

The Ministry coordinated the exchange of information, ideas, teaching materials and experiences between schools and educational centres. Contents related to disadvantaged youth support were also published[3].

Crisis team's phone numbers and e-mail addresses were are published, as well as advice by experts working at the Faculty of Humanities and Social Sciences, University of Zagreb. Andrija Stampar Teaching Institute of Public Health introduced eight phone lines available to citizens from all over Croatia.

DISTANCE LEARNING NATIONAL MINORITY STUDENTS

National minority students' education is an integral part of a comprehensive education system and schools providing education in language and letter of national minority have been participating in distance learning from the very beginning, using various sources and digital materials, creating and sharing materials among lower primary education and subject teachers, regardless of the minority education model the school is using (model A, B and/or C). Just like all other primary and secondary schools in Croatia prepared for distance learning, schools providing education in language and letter of national minority followed instructions and guidelines for schools on distance learning organization using ICT.

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[2] Education and Teacher Training Agency - distance support via e-mail communication with users needing expert assistance and support in distance learning preparation and implementation.

Faculty of Education and Rehabilitation Sciences at University of Zagreb – free telephone parents counselling on different aspects of their children's development. https://centar.erf.unizg.hr/. There is a list of areas, publicly available, in which our experts: psychologists, educational rehabilitators, speech therapists and social pedagogues, offer support and counselling. Their contact list is also available. Counselling department expert team prepared much advice on easier home school organization.

Croatian Chamber of Educational Rehabilitators – offered a platform where one may find good practice examples of schools having special programmes, education centres, individuals and a number of illustrations of support backed by rich resources. Facebook group allowed change of experience.

Croatian Association of Sign Language Interpreters for the Deaf showed initiative and, in cooperation with the Ministry, designed a system to offer support to deaf students. Croatian Association of Sign Language Interpreters for the Deaf used FB society and it functions very well (https://www.facebook.com/Hrvatsko-dru%C5%A1tvo-prevoditelja-znakovnog-jezika-za-gluhe-430978827719896/).

[3] Child and Youth Protection Centre of Zagreb https://www.poliklinika-djeca.hr/

Zagrebačko psihološko društvo – Zagreb Psychologist Association https://zgpd.hr/

The Society for Psychological Assistance https://dpp.hr/category/news/dpp-news/

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Following the initiative of Istra region, Nova TV, starting 17th March, had been broadcasting education program in Italian language for Italian national minority. The content of this TV programme has entirely been created by primary and secondary school teachers working in schools providing education in Italian language and letter. Each broadcast link is accessible at TV Nova web and Facebook pages and *Škola za život* portal.

Moreover, in virtual classrooms for Italian language as mother tongue, a forum is set up for teachers to share other materials and links more related to Italian language, while another forum offers the same possibility to all subject teachers to share materials they created in Italian language.

These and TV materials are entirely designed and created by lower primary education and subject teachers using available digital tools. ETTA's advisors for Italian national minority coordinate these activities and prepare materials for daily programmes.

Students attending classes in Czech language watch lessons via Croatian national television and, through electronic communication, receive teachers' instructions for Czech language lessons, Czech language and culture and subjects in Czech language. These instructions are in Czech language and are in line with textbooks, most of which are translated in Czech language. Textbooks digital supplement materials are in Croatian language. Also, in Czech Republic lessons are partly organized via TV and YouTube channel offering students additional way to participate in learning and get, from their teachers, links and materials to help them learn and keep up with the content and curricula. Magazine Dětský koutek pdf format, usually used in teaching model C, is also available to students.

Furthermore, in cooperation with Serbian national minority senior advisors, various online groups are created for Serbian national minority students to facilitate lesson delivery by content sharing (workbooks, film, texts) and video materials creation. Likewise, publishers in Serbia offered their digital contents free of charge which students are now using. Students watch *School on Channel 3* for all subjects' lessons delivery, while in case of optional subject Serbian language and culture (model C) teachers use Viber (1st – 4th grade) and Teams (5th – 8th grade) to give out assignments and materials. So far, teacher are satisfied with students' work.

In schools offering education in Hungarian language and letter (model A), all subject teachers deliver their lessons in Hungarian language using distance learning. To supplement these lessons students can watch lessons in Croatian on Channel 3. Students can also use Médiaklikk pages to see lessons provided via Hungarian TV. Given COVID-19 pandemics, Hungarian Ministry of Education ensured free access to all distance learning digital materials. Teachers in model C (Hungarian language and culture) have access to educational materials as well.

For all other national minorities using model C, as well as for other school subjects, lower primary education and subject teachers prepare lesson units with supplementary materials, give instructions and monitor their students' work.

Apart from combined use of TV lessons delivery, participation in various platforms virtual classrooms, numerous communication tools usage, individual education materials creation, finding the appropriate content in mother tongue in relevant countries, materials are also available at National minority distance learning link so that all sources can be found and catalogued at one place helping teachers and students navigate in an online learning environment.

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SOCIOECONOMICALLY DISADVANTAGED STUDENTS

Within CKR II project all students in grades 5 – 8 were to receive a tablet (one student – one tablet). Thus, 5th and 7th grade students had tablets ensured by the Ministry, which schools also offered for work from home. Following the Ministry's initiative, mobile network gave schools SIM cards enabling free access to digital educational contents and providing additional 2.5 GB of Internet traffic.

Similarly, the project ensured tablets for lower primary education providing one tablet per four students. Since procurement of tablets for 6th and 8th grade was still ongoing and tablets did not reach schools, the Ministry advised principles to lend tablets intended for lower primary education students and SIM cards to socioeconomically disadvantaged students in grade 6 and 8.

Secondary schools having students whose families receive minimum social benefits received around four million HRK from the Ministry, to procure tablets for socioeconomically disadvantaged students, that is, for those for which the school believes not to have computers or internet access.

During distance learning preparation principles were told of the parents' right to file a request to lend a device with internet access, and it is the principal's task to gather these requests and send them to the Ministry which provided schools with funds for device procurement. Throughout distance learning period, the Ministry authorised funds in the amount of 427.500 HRK for the procurement of 285 tablets.

Furthermore, some schools with a majority of Roma students used the allocated funds by the Ministry to equip Roma assistants with portable IT equipment (laptops for 23 of them, printers, possibly extra amounts of paper and toners) allowing them to help Roma students in Roma communities participate in distance learning. Since this proved to be a good example, the Ministry ensured funds to procure equipment for 23 Roma assistants.

UNICEF also provided help for Roma students ensuring 100 tablets and, in cooperation with TELE 2, 500 SIM cards for distance learning.

TEACHING ABROAD

The proof-readers of Croatian language and literature are assigned to 3work on 34 universities in 23 countries on four continents (Europe 18 countries, Asia 2 countries, South America 2 countries and USA in North America). During COVID 19 pandemic all proof-readers applied distance teaching and were adapted to new work conditions and organisation of the classes.

The overall teaching was held regularly according to the instructions of the universities. In these circumstances and in constant communication with colleagues and students, the proof-readers adapted their teaching materials and methods for the Croatian language and literature, bearing in mind the importance of interaction in language and speech area. the use of following platforms was in place: Microsoft Teams, Zoom, Moodle, Skype, as well as Viber, Whats App, Messenger etc.

All proofreaders have e-mail addresses on the domain **skole.hr** so that they have access to Carnet's contents and, if necessary (related to teaching materials), contact colleagues from Croatian as a foreign and second language learning centres operating at Croatian universities.

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All proofreaders completed the teaching year at a distance and processed the entire material provided for the academic year. Oral and written exams will also take place online on the agreed dates of the summer and autumn exam deadlines, in accordance with the instructions of the home universities.

According to the information obtained so far, there is a high chance that some parts of the teaching will be held online the next academic year 2020/2021 as well. The Ministry of Science and Education together with the proof-readers will monitor developments in each country and adapt to the situation and the selected scenario at each university. Giving the fact that there is a large number of countries and different continents involved, the conditions for teaching will depend on epidemiological circumstances in each part of the world, on a particular continent.

The Ministry of Science and Education will continue to strive to make teaching materials for proofreading teaching as accessible and quality as possible. According to the possibilities, computer equipment for proofreaders will be provided and coordination established in the competent services of the Ministry.

Croatian language teaching abroad during COVID 19 pandemic

For almost three decades, the ministry of education of the Republic of Croatia, affirming Croatian language and culture, cares about the preservation and development of the Croatian identity of children and young people who grow up abroad, by organizing and financing the learning and teaching of Croatian language and culture outside the homeland, which is a constitutional and legal obligation and the strategic interest of the Republic of Croatia which has numerous emigration.

The education of children and young Croatian emigrants who live temporarily or permanently abroad is an integral part of the entire system of education of the Republic of Croatia.

Currently, under the Ministries jurisdiction, the abroad teaching of Croatian language system includes about 5300 students taught by 95 teachers in 320 teaching places in 20 countries worldwide. It should be mentioned that there are requirements of the displaced Croatian community for the need and desire to open new teaching places in countries where it has not been organized so far.

Therefore, the Ministry of education ensures that materials in Croatian language are available for children and young people of Croatian roots. For the purposes of Croatian teaching, the Ministry provides recent literature in Croatian language, selected titles, textbooks, working materials, etc.

One of the challenges of the COVID pandemic – 19 is the necessity of implementing the distance learning. From the very beginning of this new situation, teachers has been adapted to the new form of teaching in all countries with the help from different sources and the use of digital materials, the production and sharing of teaching materials and ideas between teachers regardless of which country Croatian language teaching is held.

Although teachers individually and by coordination have designed platforms and teaching materials suitable for distance learning, in order to combine them and provide equal conditions to all Croatian language students, one teacher is in charge of coordinating, digitizing and supplementing teaching contents and appropriate tasks/exercises according to the Curriculum of the Croatian language teaching abroad.

Link for the materials: http://digitalniudzbenici.com/hnui/

Link for the example of digitalised teaching materials:

- http://www.hrvatska-nastava-hh.de/
- http://www.hrvatska-nastava-berlin.de/

There are different online tools used by the teachers in distance teaching of the Croatian language and culture.

The basic tools are Google classroom and e-mail communication with students and parents.

Different programmes for video conferences; (BIGBLueButton, Skype), LearningApps, WordWall, Youtube, Socrative, Zoom, Firefox, Libre Office 6.4. Google docs (forms in shape of tathing materials), Google Forms, Jigsaw planet, LearningApps.org and others.

Some students watch *Škola na Trećem HRT* programme.

For the next school year 2020/2021 in line with the possibilities, adequate IT equipment for Croatian teachers will be provided, as well as teaching materials. The Ministry will also establish coordination at the level of the competent service in order to, if necessary, ensure distance teaching continuity and maintenance of its quality. The epidemiological situation in all countries where Croatian language teaching is organised will be closely monitored and scenarios will be adapted to the conditions in each country taking into account, where relevant, the instructions from the level of educational authorities of individual countries.

Ministry, as a creator of educational policies and strategic measures, sees Croatian language students and their families as a powerful bridge between the Republic of Croatia and the country they live in, which reflects not only past, historical and cultural heritage, but also the future.

II PART: DISTANCE EDUCATION MODEL FOR 2020/2021 ACADEMIC YEAR

The second part of the document elaborates different scenarios, plans, projects and activities for distance education for the next school and academic year. It was taken into consideration the advantages and disadvantages of the distance education and possibility of applying it in different scenarios.

Teaching in the classroom is far more suitable for students and provides better opportunities for students overall educational development. This specially applies to students in lower elementary education who need support of expert assistants in many aspects such as emotional and social development, development of reading, writing, calculating, organisation of time and space. For older students distance learning is more suitable and shows better results. Distance education can be implemented for most subjects and study programmes without major difficulties and advantages of the distance education come to the fore. Experience and researches in the field of e-learning in higher education are numerous and elaborated in scientific and professional papers.

However, there are many advantages of distance education which came to the fore during the period of distance learning that could be used in education.

SCENARIOS FOR NEXT SCHOOL AND ACADEMIC YEAR

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It is difficult to predict what is going to happen in September concerning the epidemiological situation. Theoretically, we can consider the following three scenarios:

1. **Mainly face to face teaching (in classes).** All students shall return to the schools and higher education institutions where they will spend most of their time. The abovementioned model includes certain period of time during which distance learning model will be applied because it is suitable under "normal" conditions or necessary because the epidemiological situation has briefly deteriorated. Distance learning model gives students opportunity to take quality approach in learning.

2. **Combined teaching model.** Combined teaching model implies that students participate in teaching, but from home using ICT. In doing so, they have access to digital materials and a virtual learning and teaching environment. This allows for a flexible approach to deciding which classes or groups of students will reside in schools or higher education institutions.

   Teaching will therefore be partly carried out in schools and partly at home through a virtual environment**.**

   The priority is the optimal use of physical capacities in school taking into consideration all epidemiological measures. This means that not all students will be able to attend classes in school at the same time, but prioritize which students should attend classes in school and for others ensure occasional teaching in the schools.

   For example, students up to 11 years old (1-4 grade elementary schools) will attend classes in school and for others distance learning model will be applied. Reasons for such implementation are both pedagogical and epidemiological.

   It is possible to establish the weekly exchange of other students in schools as well, in order to have one group of students who are attending classes in school and other group at home. In this case there will be optimal use of school infrastructure in accordance with epidemiological framework, and students will be able to attend classes whenever possible.

Model for elementary schools is shown in picture below:

Therefore combined teaching model is applied, which is elaborated in document Recommendations for organisation of teaching for lower primary education and Guidelines for

assessment and grading in combined teaching model which had two versions – one for period of first two weeks in schools for lower primary education students in severe epidemiological framework (from 11th to 25th May 2020) and second from 25th May 2020 onwards.

Similar model can be applied in secondary education giving priority to students of final classed in attending schools as well as teaching subjects that cannot be taught online, such as practical work.

3. **Mainly distance education**. This scenario implies using distance education model at the beginning of the next school year in September and mainly implementing it during the school year or it implies introduction of distance education model if epidemiological situation deteriorates.
This scenario will use the approaches described in the first part of this document and especially in Guidelines for distance learning in primary and secondary schools as well as in Recommendations for organizing a student's workday in distance education and Guidelines for assessment and grading in a virtual environment.

The main characteristic of every three scenarios given as following:

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1. Mainly face to face teaching (in classes)
• possibility of introducing distance education for groups of students

2. Combined teaching model
• combination of f2f teaching and distance teaching but with elements of e-learning in both approaches

3. Mainly distance education
• teaching using ICT with possiblity of online assessment and grading

WAYS OF IMPLEMENTING DISTANCE EDUCATION IN "NORMNAL" CIRCUMSTANCES

In the first scenario of mainly face to face teaching (in classes) it is recommended to use the distance learning as well in order to raise the quality of teaching or to empower learning experience for all students or to adjust certain parts for vulnerable groups of students.

Distance learning and teaching (e-learning) can be used for different purposes in any "ordinary" school or academic year in order to:

- increase the access to education by special groups of students e.g. students who due to the illness are placed in hospitals or homes, talented students who are additionally engaged in sports, art or STEM activities, students in isolated places (islands or rural areas).
  Classroom teaching can be broadcast via videoconference and students can be actively involved via video call, voice or written communication. It is recommended to use shared boards and other online tools which can be used for synchronous and asynchronous communication whether they are at home or in the classroom. Communication, collaboration and sharing digital educational contents in virtual classes can be equally distributed to all students regardless of the place they are in. For students with disabilities it is recommended to use assistive technology which will help them in learning process both at home and in school.
- Share the best example practice e.g. organisation of distance learning by successful teachers, home or international experts on some interesting topics.
  Collegiate visiting classes should not be limited to physical availability, so for example, colleagues from different schools and different parts of the Republic of Croatia can be gathered together to attend each other's teaching in virtual classes or via videoconference visiting classes in school classrooms, and thereafter through reflection and feedback provide mutual support and further professional development. Organising a webinar with the sharing of good practice examples enables greater visibility of good teaching examples and equal participation of all teachers, expert associates or principals no matter where their school is located.
- Organize virtual mobility in the Republic of Croatia and abroad (virtual Erasmus programmes)

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Virtual mobility as a form of communication, collaboration and professional development is available for years mainly in eTwinning programmes, different projects and activities of the School Education Gateway, https://www.schooleducationgateway.eu/en/pub/index.htm.
For example, ERASMUS+ Virtual Exchange https://europa.eu/youth/erasmusvirtual

- Temporarily overcome a lack of teachers in certain areas e.g. Math, Physics, Chemistry, English teachers on islands
Classroom teaching can be broadcast via videoconference and students can be actively involved via video call, voice or written communication. It is recommended to use shared boards and other online tools which can be used for synchronous and asynchronous communication regardless of where they are located. The students can be temporarily involved in virtual classrooms of some other school or special virtual classes could be organised for them in which they can receive help from teachers that are not physically present in their school.

- Give students and teachers opportunity to learn/teach in virtual environment in order to gain digital skills
Online communication and collaboration are key skills in modern work environment, therefore it is important to develop those skills as well. It is recommended to give students tasks in forms of projects which imply online collaboration in teams, working together on shared documents, cooperative achievement of common project results and communication in safe environment, thus encouraging development of competencies for appropriate, responsible and safe use of ICT whether in education, work or private life.

- Advance and personalized learning and teaching by introducing new methods such as flipped classroom
The use of flipped classroom is particularly interesting. Flipped classroom conceptually supports the change of teaching paradigm that places students in the centre of learning and teaching process by directing towards planned achievement of planned learning outcomes. The students therefore take responsibilities for their achievement and the emphasis is on the development of skills for solving problems, critical thinking and informed decision making. Distance learning enables that materials are distributed to students in advance so they can be familiar with the topic in an interesting way, after which independently research other sources and experimenting and at the end the main part, discussions, exchange of ideas is to be implemented face to face in classrooms (this part can be established in virtual classrooms as well).

- Take part in projects (e.g. eTwinning) via online communication and collaboration
eTwinning is one of the activities under Erasmus+ programme. www.eTwinning.net is a website intended for international cooperation and training of teaching and non-teaching staff in education institutions at every level. Teachers and students use web page for collaboration with colleagues from European schools through various forms of training and working on common virtual projects. Various forms of professional development (through eTwinning mobility, seminars, workshops, conferences, webinars and online education) and work on joint virtual projects are available to eTwinning users. On this website one can search for manuals, publication and good practice examples that can serve as an inspiration. https://www.etwinning.hr/.

- Maintain the competitions, festivals, students gatherings through e-learning
Some forms of competition can be transformed into online versions, using different forms of interactive quizzes and checks with closed and open forms of questions, and automatic or manual assessment and feedback. For example, the International Dabar (Bebras) competition

is held online in 52 countries and in Croatia since 2016. It is fully online, which includes the creation and testing of tasks, the availability of a "training ground" for student preparation, and online implementation on the Moodle system for 25,000 students. More information available on: http://ucitelji.hr/dabar/, http://ucitelji.hr/category/dabar-2019/ i https://www.bebras.org/.

Festivals and students gathering can be organized through videoconference using different tools for online communication and collaboration.

AREAS THAT NEED IMPROVEMENT

STRATEGIC APPROACH TOWARDS IMPLEMENTATION OF DISTANCE EDUCATION

The problem of strategic implementation of distance education is complex multi criteria task. Determining criteria for decision making demands thorough analysis and implementation of suitable method. Recent analysis shows that there are three main groups of areas which need to be additionally advanced and invested in if we want to be prepared for all three scenarios.

The areas are following:

- Strategic planning which includes efficient organisation and support to the implementation of distance education, setting up priorities and managing changes on all levels
- Trainings on implementation of distance education for all stakeholders
- Equipping and programme support necessary for distance education with the suitable level of digital transformation

Strategic approach	Equipment and digitalisation	Education and support
•strategic background •top down/bottom-up •priorities •communication	•personal equipment •equipment in school /education institutions •IT systems •repository, platforms	•students •teachers •associates •principals •parents

For improvement of all three areas the baseline is established in curricular reform set in 2019 in all schools in the Republic of Croatia and pilot project e-Schools implemented by Carnet (Strategic framework of digital maturity of schools and education system in the Republic of Croatia). In higher education, there are useful experiences related to the strategic introduction of e-learning to higher education institutions, and this field is scientifically well processed, and individual HEIs can serve as examples of good practice from a position of developing strategies and effectively organising e-learning. (Questionairre MSE, https://www.srce.unizg.hr/ceu).

The organisation of distance education from March 2020 would not be successful without a strategic approach coordinated by MSE and in whose preparation and realisation all key agencies and centres participated (CARNET, SRCE, ETTA, AVETAE and AMPEU).

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HOW TO ORGANISED DISTANCE EDUCATION?

For the efficient organisation of distance education, it is necessary to examine the problems and needs of the leaders of institutions that were supposed to organize classes at school level. Therefore, in addition to the questionnaire for teachers, results we have previously quoted and described, the MSE sent in April 2020 another questionnaire to principals, with emphasis on gathering information related to improvement of distance education at school level. The questionnaire for principals was carried out from 10th to 20th April 2020 in Loomen application. The questionnaire collected reports on the work of schools during the first month of distance education from 16th March to 16th April 2020. The answer to the questionnaire was submitted by 1,339 principals and all principals agree or generally agree that teachers have been adapted to distance teaching, but that there are also those in need of support.

Analysis of the results shows, from their point of view, the area crucial for successful implementation of distance education.

1. Organisation of distance education for all teaching staff, students and parents
2. Organisation of online communication with teachers, students and parents
3. Two-ways communication with the Ministry and relevant agencies
4. Counselling and support for teaching staff, students and parents
5. Identification of needs and forms of support for all stakeholders
6. Identification of need for equipment and tools at school level.

The results also show that the timely and mutual flow of information as well as support for everyone in the process is key to success, but also that the management of the process from the central, national level (MSE and relevant agencies) is expected. Therefore, some schools have also developed their own innovative models and ways to support teachers, pupils and parents based on guidelines and general principles.

Hence the combination of *top-down* and *bottom-up* approach gives good results. Such approach should be further developed and improved. However, such way of working demands agile and lean management.

WHAT ARE THE TRAINING NEEDS FOR TEACHERS AND STUDENTS?

The basis for successful distance learning implementation in March in the school year 2019/2020 was the high level of preparedness of teachers, non-teaching staff and principals due to the introduction of curricular reform into all schools during the same school year and particularly due to the fact that one of the significant elements of reform was the planned digital transformation of education and learning in virtual classrooms. However, the process is not complete and there is room for improvement. The survey conducted at the end of March and beginning of April 2020 identified several immediate support and training needs for teachers and teachers were provided with support in time. The participants could choose three forms of support that they would use in the near future.

A vast majority of participants who answered this question, 95% of them, asked for instructions/training on distance learning assessment methods, which justifies given by the Ministry to the preparation and publishing of such instructions. One day after the closing of the questionnaire, on 3rd April, the Ministry published the Instructions on Assessment and Grading during Distance Teaching and Learning. The Ministry is available for additional questions and explanations, which will be published on the website.

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Nevertheless, there is still a very high demand for that sort of guidelines and training, because distance learning assessment does not only involve replicating the evaluation and assessment from face to face (f2f) environment but also using the online environment properly.

Besides, 45% of teachers stated they wanted even more video lessons. Thus, the delivery of video lessons also continued in the following period and approximately 4000 video lessons will be made by the end of the school year and will also be available in the following school years. The third most important form of support, in teachers' opinion, is the support in the form of specialized programmes for distance learning. The first step in this direction was a collection of 25 programmes listed in Appendix B of Evaluation and Grading Instructions,– Digital tools for learning assessment, which are open for usage. Additional training on the subject has been held in virtual classrooms since the end of May.

One out of three teachers wanted more instructions and training on the work with students with disabilities, and approximately the same fraction of them wanted additional instructions and training on distance teaching working methods. Although there are non-teaching staff in every school that can help in the adjustment of work with students with disabilities, additional training on this topic is needed, as well as on the topic of distance teaching working methods. We also point out the cooperation with the Faculty of Education and Rehabilitation Sciences of the University of Zagreb on this matter.

In the end, we must take special care of the school teaching and non-teaching staff's wellbeing by providing better ways of mutual support and assistance on the levels of schools, founders, the Ministry and the agencies in charge.

For the distance learning project to continue, it is essential to provide opportunities for additional training for teachers, non-teaching staff, principals and deans in specific areas of interest.

The following training needs for teachers have been noticed at all levels:

1. use of technology in teaching and learning
2. how to organize an online classroom?
3. how to teach and learn in online environment?
4. online teaching and learning methods
5. online assessment methods
6. how to support students in online environment,
7. online communication and collaboration, mentoring students online
8. social and emotional aspects of learning online; students wellbeing
9. supporting SEN students
10. working with gifted students in online environment
11. inquiry-based learning and supporting students to be active
12. how to prepare one's own digital material?
13. communication with parents
14. data protection and general data protection regulation in online education environment when working with minors; open educational resources, Creative Commons licence; developing a culture of sharing
15. e-Safety, appropriate and responsible use of Internet (preventing hate speech, fake news, cyberbullying)

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Trainings on digital assessment methods for teachers will be organized with the support of DG Reform as part of the project „ Support to the Implementation of Comprehensive Curricular Reform − Phase 4", which includes cooperation with international experts, trainings and enhancement of external evaluation systems, including digital tools and approaches to assessment for learning and assessment of learning.

All these training needs can be reflected to students as well. We can identify the following:

1. How can I use technology for learning?
2. How to communicate safely in an online classroom? (e-Safety, appropriate and responsible use of Internet (preventing hate speech, fake news, cyberbullying))
3. How to learn in virtual environment?
4. Are online learning methods different from face to face?
5. What can I learn from assessment, how to efficiently use peer assessment, assessment *for* and *as* learning?
6. How to ask for support and consultation in virtual environment?
7. How can I support my fellow students in virtual environment?
8. How can I identify my needs for support and material in virtual environment?
9. How to be active and enjoy inquiry-based learning?
10. How to prepare one's own digital learning material(s)?
11. How to recognize and use authentic open educational resources?

WHAT KIND OF HARDWARE AND SOFTWARE DO WE NEED?

So far, we have learnt that there are three major areas in which we must invest promptly. It was beneficiary for us that some of these issues were addressed within the curricular reform that started in all schools in Croatia in 2019, namely trainings on online teaching, hardware and software required for online education and effective organization and support for distance teaching and learning.

There are 12 most important areas for investment related to hardware and software:

1. further purchase of personal equipment for students and teachers
2. broadband connections on school level but also access for all from home
3. central support and capacities (CARNET, SRCE, local hubs at HEIs)
4. scalable and stable solutions in tools and LMS, servers capacity for half a million students and teachers
5. specialised software and tools for teaching online and especially for reliable online assessment (licencing options, database, tasks banks)
6. assistive technology and equipment for SEN students
7. platform for online State matura exam
8. learning analytics tools for feedback to students and teachers
9. tools supporting strategic management of the distance learning system at different levels
10. repositories and collaborative platforms
11. open digital material
12. investment in open source software for education purposes

HOW TO MONITOR AND EVALUATE ON REGULAR BASIS?

Monitoring and evaluation are essential processes and should be conducted at all planning and implementation stages, especially in circumstances as these, where we experience rapid and essential changes in a very short time.

During this endeavour we found the need for lean management and agile methods that include continuous calibration and improvements were important.

Monitoring and evaluation activities:

1. monitoring and evaluation activities plan
2. systemic qualitative and quantitative data collection
3. data analysis
4. better use of Big Data, learning analytics as well as Artificial Intelligence (AI) and Internet of Things (IoT)
5. immediate response to issues
6. analysis-based planning of long-term actions
7. reports publication and transparency

COMMUNICATION AND DIALOGUE WITH STAKEHOLDERS

For communication and dialogue activities teams at the Ministry and the related agencies must be established and must work continually. Transparency and communication are keys to success for all major projects, and particularly those relying on the support of a large number of people.

There are almost 800,000 students and teaching and non-teaching staff participating in the Croatian education system. There are also parents, grandparents and others that are interested parties in education. Therefore, a great majority of population in Croatia is interested in educational topics.

There are two types of communication and dialogue that we should initiate and support:

1. dialogue within the education system
2. communication with the wider public

There are different communication channels that need to be used with regard to the target group, starting from the official ones used when communicating official decisions, through online communication with schools and universities, media coverage and communication through social networks when communicating with the wider public. Given the large number of stakeholders, there should always be a backup form of communication in addition to the primary one.

Communication channels can be elaborated in more detail and there is a need for the Communication and Dialogue plan to be developed and regularly updated.

However, the most important thing is to enable students to co-create the teaching and learning process by regularly providing them with opportunities at class and school levels to express their opinions and needs for support. It is important for dialogue and questionnaires to take place at class and school levels so that improvements can be applied more promptly and in a specific way in the teaching process itself.

COMBINED EDUCATION MODEL IN THE SCHOOL YEAR 2020/2021

As previously stated, we could theoretically consider the following scenarios and models of teaching: 1. mainly face-to-face teaching, 2. combined education model and 3. mainly distance education.

All three scenarios are similar because distance learning model can coexist with f2f school model and mainly f2f teaching can be complemented by e-learning. Furthermore, in case of a pandemic threat, it is highly probable that even if f2f teaching and learning takes place in schools there might still be numerous students and teachers at risk, who will learn and teach from their homes.

It is assumed that from the pedagogical and methodological point of view it is better for students to have classes at school. Therefore, this possibility should be used to the maximum extent, while applying all the prescribed epidemiologic measures.

Combined model is described here (Recommendations for Organization of Teaching for Lower Primary Education and Guidelines for Assessment and Grading in Combined Teaching Model). The document offers a number of recommendations for scenario 2.

In addition, all the guidelines and instructions prepared for the school year 2019/2020 will be relevant for the next school year as well. This is especially the case for Guidelines for Assessment and Grading in a Virtual Environment, which can be implemented in legal acts and documents. Both its annexes should be regularly updated and upgraded.

Online assessment for high stake exams will be one of the major challenges and more effort should be given at national level to find the appropriate tools and approaches.

Therefore, these are the **main steps to be taken in the following months**:

1. Virtual classrooms should be immediately opened at the beginning of the next school year, by schools and HEIs, supported by CARNET and SRCE − similar to what was done on March 16, 2020.
2. Equipment should be distributed to students and teachers as soon as possible, by schools, including equipment currently being procured through Comprehensive Curricular Reform II project and E-Schools project.
3. Teacher training should continue as planned and should start even before the beginning of school year – Comprehensive Curricular Reform project (CCR), phase II. At the end of May 2020 the topic Digital Technology in Learning and Teaching was introduced into virtual classrooms.
4. To encourage cooperation among teachers in schools and in virtual classrooms, which is essential due to the fact that before the crisis caused by the coronavirus pandemic according to international research we had lower ranks by this criterion[1].
5. Mentor teams have to be organized, financed and kept during the whole school year in order to produce video and other teaching and learning materials – CCR project, phase II.
6. Repositories for sharing open education resources for all education levels should be prepared and maintained by CARNET and SRCE. New projects CCR III and EVO should be set up and funded.
7. Publishing an interactive database of curricula for primary schools and gymnasiums in which the educational outcomes from the subject curricula will be linked to the corresponding

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educational contents (video lessons, digital learning materials, working materials developed in CCR I, II, III, e-Schools etc.)

8. School calendars for the next school year should be aligned as much as possible (Ministry of Science and Education (MSE) and relevant agencies).

9. Online assessment tools and trainings preparation (including State matura exam) should be carried out by the MSE, relevant agencies, CARNET, SRCE and National Centre for External Evaluation of Education (NCEEE). In order to find complete and modern solutions, preferably open access, new projects CCR III and EVO should be set up and funded.

10. Legal framework adjustment to include the new mixed model of education is still required. The Croatian education system is over-standardized when compared to other EU member states and provides very little freedom in responding to crisis situations or experimenting with new approaches and methods. Therefore, it is necessary to simplify and modernize regulations as well as laws governing the system of education, higher education and science. This is the task of the MSE, the Government and, in the case of passing a law, the Parliament.

11. Communication with all stakeholders should be planned and ensured through various communication channels. Coordination and management of these activities is the task of the MSE.
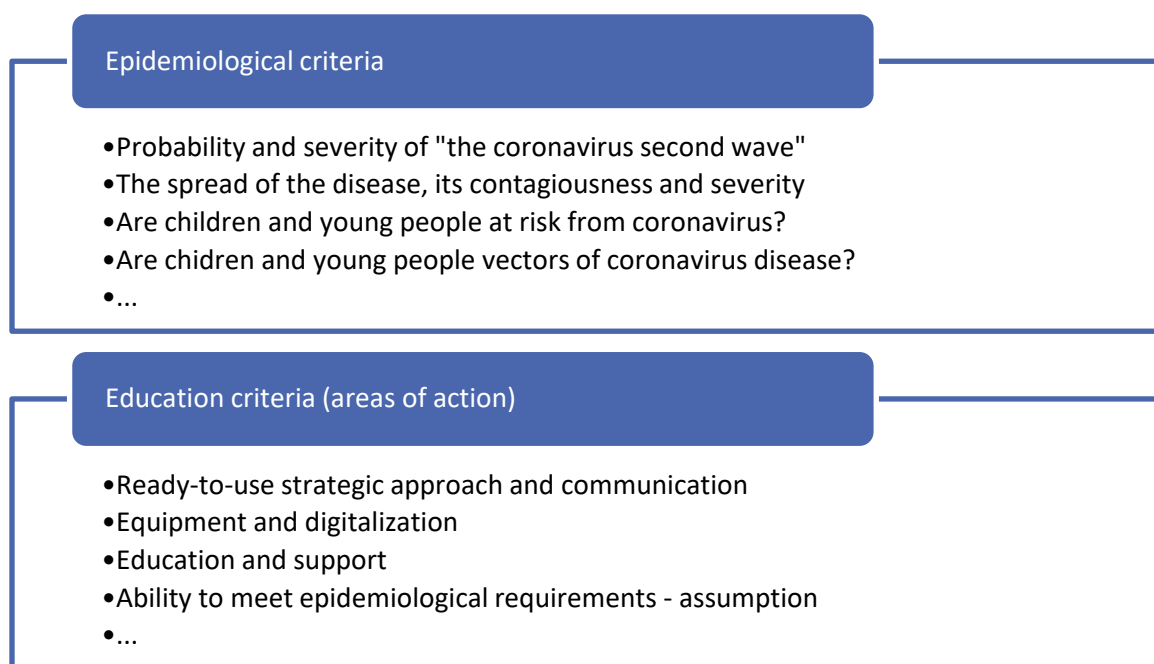
SUMMARY OF SCENARIOS RELATED TO AREAS OF ACTION

The following table summarizes the likely scenarios related to the most important areas of action.

Areas of action Scenarios	Strategic approach and change management	Equipment and digitalization	Education and support to stakeholders
Mainly face-to-face teaching	- change management based on CCR plan - mainly *bottom-up* approach (co-creating) - emphasis on mutual internal communication	-equipment for teachers and students should be renewed and schools/classrooms should be equipped on a regular basis	- CCR II plan – implementing the goals of the curricular reform and developing digital skills -availability of continued support and FAQ
Combined education model	- change management through CCR and AP distance learning -balancing *top-down* and *bottom-up* strategic approaches - ensuring mutual internal communication and clear external communication	-equipment for teachers and students should be significantly supplemented -investment in development of digital materials and repositories -connecting information systems	- CCR II and CCR III plan – accelerating e-Schools trainings with specific topics of safety and behaviour in online environment - regular communication with all students
Mainly distance education	- change management through agile methods which combine CCR and AP distance education, accompanied by acceleration of digital transformation processes and clear communication strategy - predominantly *top-down* approach when establishing the model, whereafter co-creation is encouraged	- equipment for teachers and students should be significantly supplemented -investment in development of digital materials and repositories -procuring systems for online assessment and attendance records - interoperability and interconnectivity of information systems	- CCR II and CCR III plan – accelerating e-Schools trainings with specific topics of safety and behaviour in online environment, technical and methodological support for students and teachers in real time - regular support for students provided by non-teaching staff

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	- ensuring mutual internal communication and targeted external communication -mutual communication with students, especially those at risk		– support and education for parents/guardians

The question then arises as to which scenario to select at a particular moment. The first selection of scenarios will have to be made at the very beginning of September, and subsequently, following each significant change in the epidemiological situation. There are two basic sets of criteria that decisions are based on: the given epidemiological situation (danger to human life and health, ie the spread of the disease caused by the COVID-19 virus) and the conditions for the implementation of a particular scenario in the education system. The following overview gives two basic sets of criteria, including some of the most important criteria belonging to that set. The most important criteria in education represent areas of action where the projected scenarios can be implemented

Epidemiological criteria

- Probability and severity of "the coronavirus second wave"
- The spread of the disease, its contagiousness and severity
- Are children and young people at risk from coronavirus?
- Are chidren and young people vectors of coronavirus disease?
- ...

Education criteria (areas of action)

- Ready-to-use strategic approach and communication
- Equipment and digitalization
- Education and support
- Ability to meet epidemiological requirements - assumption
- ...

The education criteria include the ability to meet the prescribed epidemiological measures. This is actually a precondition for the implementation of a particular scenario. However, if certain preconditions cannot be met, that scenario should be reconsidered in the given circumstances. An example of this is the combined teaching model for lower primary students in May and June 2020, which works well in line with epidemiological requirements. However, if school teaching was conducted for all students, epidemiological requirements could not be met.

By now, decisions on closing schools and conducting certain forms of distance teaching were primarily based on the epidemiological situation, and the preconditions for the implementation of a particular scenario in the education system were determined and ensured „on the fly". During a potential second wave of the coronavirus pandemic, both sets of criteria need to be considered. Each basic multicriteria

analysis (eg AHP Analytic hierarchy process technique) shows that the first set of criteria related to the epidemiological situation is more important than the second one. Nevertheless, these relations can change and it is highly recommended to conduct group decision-making regarding the importance of criteria and subcriteria.

Subsequently, a selection of priorities, or one of the three proposed scenarios can be conducted (here it is also possible to use AHP group decision-making) in order to determine the most acceptable scenario for the given situation.

However, given that the final decision will not be made until early September, it is evident that conditions in the education system need to be prepared for all three scenarios. In practice, this means that we should prepare for the scenario related to the most difficult situation, which means performing teaching mainly online.

If the risk is observed (here the risk is an uncertain event or a set of circumstances which, if it occurs, has an effect on the education system), which includes the probability of a second coronavirus wave (unlikely, likely and almost certain) and the impact of the education system on the spread of the pandemic, then the analyses so far show that we should prepare for the second and the third scenario, ie for the combined education model and mainly online teaching for the next school/academic year.

A graphical representation of a simple matrix of impact and probability analysis and an appropriate choice of a teaching scenario is given in the following figure.

RISK MATRIX– relations to scenarios that need to be prepared			
	Most certainly „second wave"	Combined teaching model	Mainly distance education	Mainly distance education
	Medium probability - "second wave"	Combined teaching model	Combined teaching model	Mainly distance education
PRORABILITY of the "second wave" of the pandemic	Low probability	Mainly face to face teaching	Mainly face to face teaching	Combined teaching model
		Children and youth are not under risk and mainly not carriers	Children and youth mainly are not under risk, but are potential carriers	Children and youth under risk I potential carriers

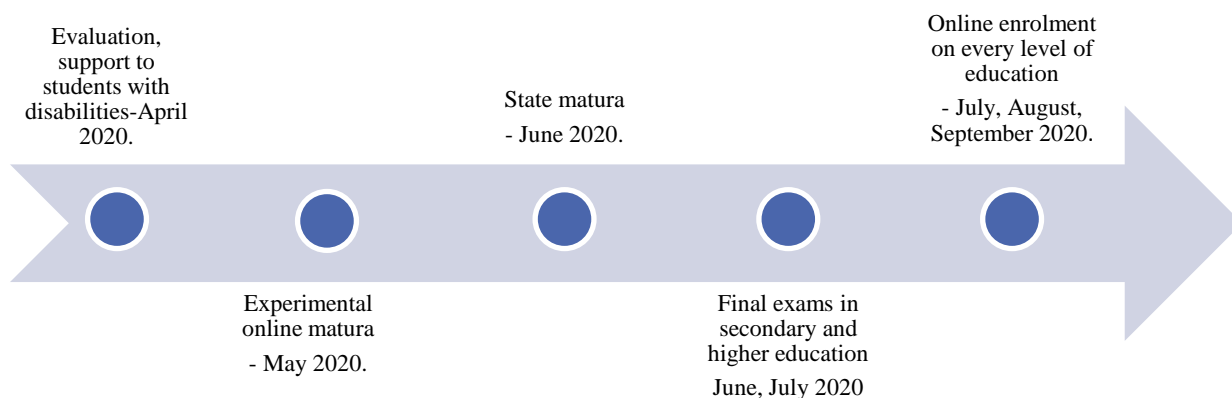|	INFLUENCE of the education system on students and employees health and transmission of the disease

Every risk is the function of probability of occurrence and impact on the situation. The events can be classified as low risk (coloured green), medium risk (coloured yellow), high risk (coloured red). The first scenario will apply for low risk, meaning that the implementation of the face to face teaching will be established by applying the epidemiological measures. Medium risk implies second scenario, implementation of the combined teaching model. High risk implies third scenario, implementation of the distance education model.

TIME FRAMEWORK AND SOURCES OF FUNDING

WHAT COMES DURING THIS SCHOOL AND ACADEMIC YEAR?

This school and academic year and information we have gathered give us a solid baseline for further planning. Firstly, we must address the most important and urgent issues, but at the same time we should keep a broader perspective in mind, to be able to plan on the larger scale. Digital transformation gives numerous advantages that are not limited only to the respond in the crisis.

We are now in the middle of distance education implementation that goes beyond many expectations; still there are challenges that need to be met appropriately and with competence. Besides abovementioned basic activities, it is ensured that following activities are implemented:

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Evaluation, support to students with disabilities-April 2020.

Experimental online matura - May 2020.

State matura - June 2020.

Final exams in secondary and higher education June, July 2020

Online enrolment on every level of education - July, August, September 2020.

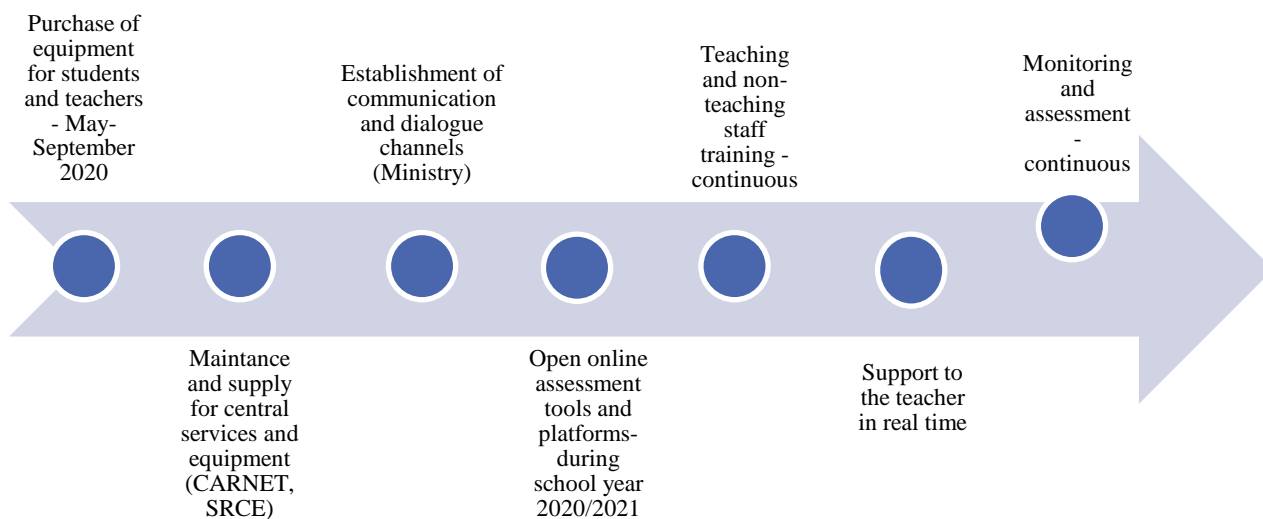## HOW TO PREPARE FOR THE NEXT SCHOOL AND ACADEMIC YEAR?

The current spread of COVID-19 around the globe is forcing humankind to innovate and change the way people work and live. In light of that, we have to reconsider the way we educate, teach and learn, not just as a short-term response to the immediate danger but also strategically and for the long-term.

Thera are many predictions on what our world may look like in autumn 2020, but also on how we are going to work, teach and learn once the pandemic ceases.

Nevertheless, what we have learnt, and may expect in nearby future, includes the following:

1. More contactless, online interactions
2. Strengthened digital infrastructure for education and research collaboration
3. Better use of Big Data, Learning Analytics
4. More online events and activities that besides students includes their parents/carers
5. More digital education materials, e-books and platforms
6. More virtual mobility instead of physical mobility (Erasmus +)
7. More individual approach to SEN in virtual environment
8. Digital transformation of educational systems (schools and HEIs) is irreversible (permanent)
9. Distance education is usable in non-corona situation
10. Every risk response scenario must include back-up options

Taking it into consideration, we must use the given possibilities and preprare for different types of scenarios. To respond to the new and exceptional challenge for the next school and academic year we have to implement the activities on the chart below:

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The timeline shows (top row, left to right): Purchase of equipment for students and teachers - May-September 2020; Establishment of communication and dialogue channels (Ministry); Teaching and non-teaching staff training - continuous; Monitoring and assessment - continuous.

(bottom row, left to right): Maintance and supply for central services and equipment (CARNET, SRCE); Open online assessment tools and platforms- during school year 2020/2021; Support to the teacher in real time.

HOW ARE WE GOING TO FUND IT?

Education and training should be a priority in every crisis because only talented, well educated people can change crises into wellbeing for all. However, for every new step a careful plan of funding is necessary.

Funding sources for this digital transformation are the following:

- State budget
- EU funds and programmes
- World Bank support
- Private contributions
- Volunteering

At the moment, there are not enough parameters at hand to give an approximation of the funds needed. Nevertheless, the biggest financing source is the state budget because it covers salaries of almost 90,000 employees in education and science system. Furthermore, equipment purchase for staff, students and central services, as well as teacher training can be EU funded, but the timetable should be much faster and we should adhere to it.

There is a number of other expenses related to the necessary activities (such as financing central video lectures, central support teams, online assessment etc.) that still need to be tackled.

Procurement plan for school year 2020/2021 envisaged the equipment purchase for students and teachers funded by two ongoing projects: CKR II and e-Schools.

Purchase of 109.885 tablets in the amount of 154.561.609, 00 HRK for primary education students is funded under CKR II project (ESF). The procurement procedure is carried out by the Central state office for public procurement. Public procurement is announced on 3rd of March 2020.

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Purchase of 26.755 laptops in the amount of 88.950.000,00 HRK for teachers is funded by e-Schools (ESF, ERDF) project carried out by the Carnet. Public procurement is announced on 1st of June 2020.

NEW PROJECTS – ESF COVID-19 MEASURES

Besides the approved projects (CKR I, CKR II, e-Schools), the Ministry has developed two projects related to schools and higher education institutions. The Ministry proposed to the Ministry of labour and pension system following activities that would be assigned to the Ministry in partnership with relevant agencies (ETTA, CARNET, NCEEE and AVETAE) and SRCE as beneficiaries.

Project: Support to the comprehensive curricular reform, phase III (CKR III), 295 million HRK.

The direct award that would be implemented by the Ministry in partnership with CARNET, National Centre for External Evaluation of Education, Education and Teacher Training Agency, Agency for Vocational Education and Training and Adult Education. The operation continues with the activities set in previous two reform projects in primary and secondary education related to digitalisation of validation that can be applied to combined teaching model. The operation envisages introduction of digital State Matura, which will enhance the process of data analysis and test evaluation. Following activities will be financed:

1. Introduction and implementation of digital assessment in primary and secondary education institutions as well as introduction and implementation of digital State Matura (50 million HRK)

2. Purchase of laptops for secondary education students from low socioeconomic background (40.000 students, 140 million HRK)

3. Purchase of laptop for implementation of State Matura (30.000 students, 105 million HRK)

Project: EHE - e-Higher education, direct award to University computing centre (SRCE), 50 million HRK
Direct award to SRCE to enhance its capacities in order to support the higher education institutions involved in the teaching process by using the modern ICT (e-infrastructure), with emphasis on using the e-learning technologies and tools. . In the long term, the development and improvement of digital support in higher education, using learning analytics, will contribute to improving the quality of learning and teaching in terms of targeted support for students in acquiring prescribed learning outcomes. Following activities will be financed:

1. Support to the professors in higher education institutions in distance teaching (development and implementation of e- class)

2. Support to the professor in development of digital evaluation tools

3. Enhancing the capacities of the professors and giving targeted support to the stakeholders in higher education system

4. Linking the e-learning system with other information systems used in higher education

Additionally, the Ministry has in 2019 proposed to the Managing authority for the ESF the 150 million HRK value project related to supporting the parents of preschool children by financing early childhood and preschool education.

CONCLUSION

Distance education has been introduced in most countries due to the spread of COVID-19. It was abrupt and most education systems responded to that with more or less success. Those systems, Croatian being one of them that had been in digital transformation process before COVID-19 outbreak, have more chances of success. In distance education implementation, it was essential to combine clear national overarching design (top-down) with grass-root initiatives. Agile lean management is most suitable for that endeavour. Based on monitoring and evaluation of that experience we can plan the future steps of distance learning implementation. This relates to the development of possible scenarios and their implementation as well as ensuring necessary investment.

It is crucial to emphasised the importance of clear communication and transparency of the taken processes with the stakeholders in education and science as well as with public. However, it is difficult to find the communication channels that will reach each and every stakeholder.

According to the predictions of the experts regarding the "second wave" of the pandemic, it is highly likely that school and higher education institutions will not be fully employed. Therefore, it is prudent to plan distance learning for a part of the next school year. Following scenarios are developed: face to face teaching combined teaching model and mainly distance education. For each scenario three key areas need to be adjusted: strategic approach, equipment and digitalisation and education for stakeholders.

Funding is ensured through state budget and European funds for procurement of additional equipment, education and communication and support.

Investment in equipment and internet access is necessary, but it is also necessary to see the most important lessons we have learnt during this school year related to the very approach to distance learning and teaching and the roles and needs of individual stakeholders in this system. Here we highlight the need to structure distance education and student/teacher working hours, the challenges of monitoring and evaluation, supporting distance work in technical, pedagogical-methodical and psychological terms, as well as supporting vulnerable groups of students and teachers.

Furthermore, the advantages of distance education should be used, regardless of whether they are widely applied as at the time of the pandemic. In fact, the digital transformation of education is a necessity and because of the needs of the labour market it positively affects the equalisation of opportunities for everyone in education, and now we have valuable experiences and tools and the opportunity to improve the quality of education.

At the end, the question raises, which scenario to choose at a given time. There are two basic sets of criteria based on which the decision is made: the given epidemiological situation and the conditions for the implementation of a particular scenario in the education system. Until now, decisions of this kind have been made primarily on the basis of the epidemiological situation, and the conditions for the execution of a particular scenario have been established and ensured "on the fly". In a potential second wave of pandemics, it is necessary to take into account both sets of criteria. Since the final decision will only be taken at the beginning of September, it now follows that conditions in the education system should be prepared for all three scenarios.in practise, it means that one should be prepared for the worst case scenario i.e. distance education model. There is a possibility for changes in the scenarios during the next school and academic year.

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Reference: links within the text