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Introduction

"Education is back where it belongs – at the top of the European policy agenda" stated the European Commission. We intend that Europe will be considered a strong and allied partner to future generations, and that the EU education system must make our societies future proof.

Education is often envisioned in terms of innovation, excellence and competitiveness. But learning is also about reaching personal perfection, using a holistic approach that supports personal and professional development, learner needs and self-realization across different learning environments. Creativity contributes to diversity and innovation, thus Europe's cultural and creative sector is recognized as a substantial resource and driver for innovation and growth.

Digital education has proven to change learning and working practices in the society of today. Intelligence, human and artificial, is in focus, and understanding students and their learning and application of new technologies in education inspires further development.

Skills in Science, Technology, Engineering and Mathematics (STEM) represent an important part of basic literacy in today's knowledge economy. With the inclusion of a critical component – the human being, STE(A)M Education integrates the arts – humanities, languages, dance, drama, music, visual arts, design and digital media. Increasingly, higher education institutions, as well as adult and professional learning are being transformed by intelligent systems that are helping humans learn better and achieve A balanced relation between Artificial and Human intelligence can create trusted, flexible, personalized and inclusive digital learning eco-systems.

For EDEN, the Annual Conference has always been the most important event of the year. It is held every year in June, and our members and partners look forward to it: meeting friends and colleagues, sharing experiences and knowledge, getting new ideas to take with to their workplaces.

In 2020, due to the COVID-19 pandemic, the 29th Annual Conference was held fully online, and albeit completely virtual, We trust that this did not make the conference any less good or interesting than the face to face event.

Because of the pandemic, educators had to adopt new solutions and technologies and to use tools powered by artificial intelligence. The lockdowns and the forced move to online teaching and learning have changed the role of physical space in education and has put pressure on teachers to design new learning environments that are flexible, adaptable, and suitable for a multitude of different users at the same time.

Challenges, brought to all of us by the pandemic, have forced us to move from our safe comfort zones into the unknown. Things we have been talking about for many years have suddenly become necessary and possible and have swiftly pushed teachers, students, and educational institutions into the digital era.

Although the situation has been forced upon us, the pandemic also offers an opportunity to take up the challenge. Let us take advantage of it and jointly find ways for making education and our lives better!

Andras Szucs	Diana Andone	Sandra Kucina Softic
EDEN Secretary General	EDEN Vice President	EDEN President

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TABLE OF CONTENTS

Reframing Working, Rethinking Learning: The Future Skills Turn 1
Ulf-Daniel Ehlers, Laura Eigbrecht, Baden-Württemberg Cooperative State University Karlsruhe, Germany

ECCOE: Toward a Robust Solution for the Cross-Institutional Recognition and Validation of Prior Learning 11
Timothy Read, UNED, School of Computer Engineering, Spain, Deborah Arnold, AUNEGe, France

Ethical Codes and Learning Analytics 20
Stephen Downes, National Research Council Canada, Canada

A Literature Review on the Definitions of Dropout in Online Higher Education 73
Marlon Xavier, Julio Meneses, Universitat Oberta de Catalunya (UOC), Spain

Essential Inputs to Evaluation the B-Learning Undergraduate Programme in Environmental Sciences .. 81
Ana Paula Martinho, Paula Vaz-Fernandes, Carla Padrel de Oliveira, Universidade Aberta, Portugal

Digital Badges for Students' Assessment and Recognition – A University Case 91
Margarita Tereseviciene, Elena Trepulė, Rasa Greenspon, Vytautas Magnus University, Lithuania, Nilza Costa, Aveiro University, Portugal

Teacher Practices in Using Learning Analytics to Enhance Learning in Blended Online Studies 99
Airina Volungevičienė, Vytautas Magnus University, Lithuania, Josep M. Duart, UOC, Spain, Justina Naujokaitienė, Giedrė Tamoliūnė, Rasa Greenspon, Vytautas Magnus University, Lithuania

Assessing Critical Thinking in Open-ended Answers: An Automatic Approach 109
Antonella Poce, Francesca Amenduni, Carlo De Medio, Alessandra Norgini, Roma Tre University, Department of Educational Sciences, Italy

Integrating an AI-Driven Discussion Platform: The Impact of Platform on Engagement and Quality 117
Cassie Hudson, Audon Archibald, Tania Heap, University of North Texas, United States of America

Investigating the Impact of an AI-driven Discussion Platform on Educator Perceptions and Feedback 127
Tania Heap, Cassie Hudson, Audon Archibald, University of North Texas, United States of America

Science Education and Artificial Intelligence – A Chatbot on Magic and Quantum Computing as an Educational Tool 137
Miquel Duran, Sílvia Simon, University of Girona, Fernando Blasco, Universidad Politécnica de Madrid, Spain

The Impact of Emotions on Student Participation in an Assessed, Online, Collaborative Activity 143
Jake Hilliard, Karen Kear, Helen Donelan, Caroline Heaney, The Open University, United Kingdom

Impact of AI Application on Digital Education Focused on STE(A)M 153
Christian-Andreas Schumann, West Saxon University of Zwickau, Germany, Kevin Reuther, University of the West of Scotland, United Kingdom, Claudia Tittmann, Anna-Maria Clauß, Julia Kauper, West Saxon University of Zwickau, Germany

Methodology for the Development of a Competence Framework for STE(A)M Educators 162
Natalia D. Spyropoulou, Achilles D. Kameas, Hellenic Open University & Computer Technology Institute and Press (CTI) – Diophantus, Greece

External Stressors and Time Poverty among Online Students: An Exploratory Study 172
Claire Wladis, Alyse C. Hachey, City University of New York, Katherine M. Conway, University of Texas at El Paso, United States of America

A Conceptual Framework for Real-Time Emotional-State Monitoring of Students in VLEs to Identify Students at Risk 184
Lubna Alharbi, University of Liverpool, United Kingdom, University of Tabuk, Kingdom of Saudi Arabia, Floriana Grasso, Phil Jimmieson, University of Liverpool, United Kingdom

Walking the Tightrope: Online Student Engagement Experiences 194
Orna Farrell, James Brunton, Dublin City University, Ireland

Where are the Students? Social and Learning Practices in Digital Settings 201
Daniel Domínguez, Inés Gil-Jaurena, Javier Morentin, Belén Ballesteros, Alberto Izquierdo, Adriana Kiczkowski, Universidad Nacional de Educación a Distancia (UNED), Spain

Emerging Trends in OER Studies in China (2001-2019) – A Scientometric Analysis on CiteSpace 208
Jin Zhu, Open University of China, China

A Review and Content Analysis of the Turkish Online Journal of Distance Education Publications between 2000 and 2015 217
Cengiz Hakan Aydin, Anadolu Universit, Turkey, Olaf Zawacki-Richter, Carl von Ossietzky University of Oldenburg, Germany, Aras Bozkurt, Anadolu University, Turkey

The Name of the Rose: An Enigmatic Relationship between Tacit and Explicit Knowledge to Innovate the Production Process of Educational Resources 226
Tomás Bautista Godínez, Ricardo Arroyo-Mendoza, Jorge León-Martínez, Edith Tapia-Rangel, Coordination of Open University and Distance Education, UNAM, Mexico

Wikipedia, a Sociotechnical Resource? 235
Teresa Cardoso, Filomena Pestana, Universidade Aberta, Laboratório de Educação a Distância e Elearning (LE@D), Portugal

Use of Artificial Intelligence to Predict University Dropout: A Quantitative Research 245
Francesco Agrusti, Gianmarco Bonavolontà, Mauro Mezzini, Roma Tre University, Italy

Developing and Delivering a High School Artificial Intelligence Course in Blended and Online Learning Environments 255
Antonios Karampelas, American Community Schools of Athens, Greece

How Do We Know They are Learning? Student Data and the Synergies of Human and Artificial Intelligence (AI) 262
Paul Prinsloo, University of South Africa (UNISA), South Africa, Lisa Marie Blaschke, Carl von Ossietzky Universität Oldenburg, Germany, Don Olcott Jr., Global Consultant & Professor: Leadership and Open/Distance Learning, Romania

Digital Education, Work and Artificial Intelligence: Health and Law 277
Abílio Azevedo, Universidade do Porto, Patrícia Anjos Azevedo, Politécnico do Porto, Portugal

DIGI-HE – A Strategic Reflection Tool on Digitalisation at European Higher Education Institutions 289
Ulf-Daniel Ehlers, Patricia Bonaudo, Baden-Württemberg Cooperative State University Karlsruhe, Germany

Integrating Mini-MOOCs into Study Programs in Higher Education during COVID-19. Five Pilot Case Studies in Context of the Open Virtual Mobility Project 299
Ilona Buchem, Beuth University of Applied Sciences Berlin, Germany, Francesca Amenduni, Antonelle Poce, University degli Studio Roma Tre, Italy, Vlad Michaescu, Diana Andone, Universitatea Politehnica Timisoara, Romania, Gemma Tur, Santos Urbina, Universitat de les Illes Balears, Spain, Branislav Šmitek, University of Maribor, Slovenia

Secondary School Teacher Support and Training for Online Teaching during the COVID-19 Pandemic....311
Cecilia Fissore, Marina Marchisio, Sergio Rabellino, University of Torino, Italy

Can e-Learning be a Solution for Egyptian Higher Education in the Times of COVID-19? A Look at Technological Capacities and Digital Skills....321
Hector Niehues-Jeuffroy, Olena Rusnak, GIZ, Germany

Supporting Virtual Mobility Skills in a MOOC: Preliminary Results....335
Antonella Poce, Francesca Amenduni, Maria Rosaria Re, Carlo De Medio, Roma Tre University, Department of Educational Sciences, Italy

Introducing 360-Degree Video in Higher Education: An Overview of the Literature....345
Maria Ranieri, Isabella Bruni, Damiana Luzzi, University of Florence, Italy

Digiculture – The Development of Open Education Learning for Digital Skills Training....354
Diana Andone, Andrei Ternauciuc, Radu Vasiu, Vlad Mihaescu, Silviu Vert, Politehnica University of Timisoara, Romania

Are Students Reading their Teachers' Comments? The Impact of Digital Feedback in Adult Learning Secondary Education....364
Carme Durán, David Pinyol, Institut Obert de Catalunya, Generalitat de Catalunya, Spain

The Student Study Experience – Analysing Student Study Choices....373
Chris Edwards, Mark Gaved, The Open University, United Kindom

The Student-Inquirer Identity during the Master Thesis in an Online University....380
Angelos Konstantinidis, Antoni Badia, Universitat Oberta de Catalunya, Spain

Fostering Retention in Online Higher Education: Students' Perceptions of an Intervention Addressing their First-Year Experience....389
Marlon Xavier, Julio Meneses, Universitat Oberta de Catalunya (UOC), Spain

Building New Spaces for Education throughout Life, Aprendo+ Courses....398
Jorge Leon-Martinez, Edith Tapia-Rangel, National Autonomous University of Mexico (UNAM), Mexico

Developing an Innovative Program for First Year Engineering Statistics Students at an Open Distance University....407
Richard Naidoo, IODL, CGS, Mosia Ngaka, Mechanical Engineering, CSET, Unisa, South Africa

Open Educational Practices in Romanian Universities during the Educational Disruption....416
Diana Andone, Politehnica University of Timisoara, Gabriela Grosseck, West University of Timisoara, Carmen Holotescu, "Ioan Slavici" University of Timisoara, Romania

ABC LD – A new Toolkit for Rapid Learning Design....426
Clive P. L. Young, Nataša Perović, University College London, United Kingdom

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SECONDARY SCHOOL TEACHER SUPPORT AND TRAINING FOR ONLINE TEACHING DURING THE COVID-19 PANDEMIC

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Abstract

In Italy, due to the Covid-19 pandemic, all schools were closed on March 5, 2020 and it was mandatory to switch to "distance learning", in order not to interrupt the teaching continuity and to guarantee the right to education for all students. The Ministry of Education suggested several initiatives to teachers, including the PP&S national project. In the paper we analyse why and how the PP&S project, intended for teachers of secondary schools of the STEM disciplines but opened in the emergency to teachers of all disciplines, was able to provide much needed support and not only. Following this opening and the consequent registration of many new teachers, three different phases were carried out: an analysis phase of the teachers' needs for online teaching, a phase of support and initial help, and a training phase. The results show an extremely high participation of the teachers and a wide online collaboration. All the teachers of the PP&S will certainly have an advantage in the post-covid teaching, since they can take advantage of the work done and the experience and skills gained in the past.

Introduction

In Italy, due to the Covid-19 pandemic, all schools were closed on March 5, 2020 and will not be reopened until after the end of this school year. After the lockdown of the schools and the suspension of face-to-face lessons, it was necessary to switch to "distance learning", in order not to interrupt the teaching continuity and to guarantee the right to education for all the students. Not many schools were prepared for this type of change. For example, because they did not adopt online teaching in normal teaching, teachers did not have the adequate digital skills and adequate computers, so teachers and students were not used to working in a Digital Learning Environment (DLE), a shared virtual space. Some schools chose to adopt a unified solution for all classes, while other schools gave teachers the opportunity to adopt the virtual learning environment that they considered most appropriate for their subject. After a reasoned and aware choice of the virtual learning environment to be used for online teaching, the teachers had to quickly learn how to use it and they had to transform the teaching practices that they would have carried out face-

to-face into an online mode. The Ministry of Education created a site dedicated to distance learning, to globally distribute instructions to teachers and schools who had to activate some forms of distance learning and did not know which tools to choose and had no examples of activities to get inspiration from. In fact, according to the Ministerial Decree of 8 March 2020, each School Head was able to activate the distance teaching methods at his/her discretion and liking, for the entire duration of the suspension of educational activities in schools, with particular attention to specific needs of students with disabilities. This site (available at https://www.istruzione.it/coronavirus/didattica-a-distanza.html) offers a list of cooperation tools, exchange of good practices and twinning between schools, training webinars, multimedia content for study, certified platforms (also in accordance with the privacy protection regulations) for distance learning. Part of these tools can be used for free during the lockdown period thanks to specific protocols signed by the Ministry of Education. One of the proposed initiatives is the PP&S national project (Barana et al., 2019). The PP&S – "Problem Posing and Solving" – project (available at www.progettopps.it), headed by the Italian Ministry of Education, promotes since 2012 the training of teachers of secondary schools on innovative teaching methods, through the use of digital technologies, and on the creation of a culture of problem posing and problem solving, with the use of Information and Communication Technology (ICT). Teachers involved in the project learn how to use different kinds of digital tools and new methodologies, in order to enhance their daily didactic. The University of Turin is one of the partners of this project and hosts and maintain the IT infrastructure of the project. Initially, it was intended only for teachers of secondary schools of STEM disciplines but, during the emergency from Covid-19 the project, it was opened to teachers of secondary schools of all disciplines to support them in online teaching. The project also allows the enrolment of the entire school in order to facilitate teachers and students in the use of a single DLE. By enrolling in the project, totally free of charge, teachers have the possibility of having an integrated DLE for all the classes of students they need. Within it, students can be provided with multiple resources (interactive materials, links, videos, theoretical explanations, etc.) and numerous synchronous and asynchronous other online activities. The activities carried out by students can be evaluated, alone or in a group, and it is possible to monitor the students' actions on the platform and the learning objectives achieved. The teachers who were part of the PP&S before the pandemic and the closure of schools were already using the digital environment integrated in their daily teaching. As a result, it was much easier for them to switch to distance learning. In their case, we believe that we can speak effectively of online teaching. After opening the project to teachers of all disciplines and the consequent registration of many new teachers (Table 1), the first step was to try to detect (through an optional questionnaire) the main needs of teachers for online teaching. For example, on the use of the virtual learning environment, on the activities and resources that can be used, on the assessment of students and on the monitoring of their platform

activities. At the same time, special comments, suggestions and training needs were collected. This phase of needs analysis was followed by a support phase and a training phase for teachers, organized thanks to a group of expert teacher trainers who, from the beginning of the project, carry out face-to-face training activities and online training activities. The support phase, which took place in the first period of school lockdown, was characterized by individual synchronous online training meetings to give teachers a first basic training and to support them in the initial emergency and in the transition to online teaching. Compared to the online training meetings that took place regularly within the project, it was sufficient to increase the hours of training to be able to reach all the teachers who enrolled in the project from time to time and to be able to vary the topics of the training meetings while maintaining the basic training feature. In addition, all the teachers of the PP&S could collaborate on the platform within the Community of the Teachers of the PP&S to exchange tips, teaching practices and ideas, and they always had the support of the teacher trainers of the project, who were available through the Helpdesk service of the platform and through forums. In May, when most of the teachers had started teaching online with the students and had become familiar with the proposed tools, the training phase began. This phase, still ongoing, is characterized by an open vision to go beyond basic training. In this phase, teachers are offered advanced courses on online teaching, which also include activities to be carried out together with the students. This allows teachers to develop advanced skills that will be very useful also in post-covid teaching and to reflect deeply on how to rethink teaching practices and methodologies. The training phase will also include an advanced training phase on specific topics (such as learning object design, use of OER-Open Educational Resources, Learning Analytics, etc.) for teachers who have been participating in the project for many years and use the online teaching in their daily teaching. In this paper we present the analysis phase of the teachers' needs and the support and training phase. As the results show, the participation of the teachers (new members of the project and not) was high and there was a lot of collaboration on the platform between the teachers and between teachers and trainers, especially between teachers already enrolled in the project for a long time and teachers who had just registered. At the end of the school year, all teachers will receive a certification of all the training activities in which they participated and a certification of all the activities carried out on the platform. The activities carried out by the teachers in online teaching and the participation of the students will also be analysed in detail to understand the activities and resources that proved most effective and engaging. Further considerations will also be taken on online teaching and on the change of the school during the emergency, on the proposed training activities, on the repercussions that online teaching had on students and their comments. In the paper we discuss why and how the PP&S project was able to immediately detect the needs and play an important role of

immediate support and useful training for the change of paradigms to which the teaching will be subjected.

Table 4: General overview of the PP&S project, last update May 27, 2020

	Amount		Amount
Users	26037	New users AY 2019/2020	4386
of which teachers	1842	of which teachers	402
of which students	24195	of which students	3984

Online teaching in an integrated Digital Learning Environment

Distance learning and online teaching are not the same thing. Online teaching, not only during this emergency period, should not be a mere transfer of face-to-face lessons in synchronous online mode via web conference. Here are several reasons why: it is very difficult for students to stay in front of a screen for many consecutive hours; students are not necessarily able to connect due to slow or overloaded home internet connections (digital divide); large families do not necessarily have a device for each family member and there may be organizational problems; there may be privacy problems related to the desire of not using the webcam; there may be technical difficulties in getting students to work (for example in the absence of a blackboard); there may be economic problems in the family to guarantee one or more mobile devices and an adequate internet connection; it is more difficult to stay focused on the lesson and concentrated for a long time outside the school context and in a private context with many distractions. At the same time, online teaching cannot consist of a simple transmission of materials and tasks and exercises. Online teaching is a form of teaching that consists of resources but also and above all asynchronous activities that are always available, which students can carry out when they can and when they prefer. In fact, online learning allows students to study from home respecting their own times and independently organizing the time schedule of the study. It is certainly necessary that the didactic proposals are, as always, built on quality content and that they are structured in a precise way, considering the students' previous knowledge. Resources and activities can be multimedia and can be the result of the integration of different media to facilitate students' understanding and personalization based on each person's characteristics. A fundamental component for Online Teaching is the DLE, an online space shared between teacher and students for the availability and use of training (Rogerson-Revell, 2007). The DLE of the PP&S is based on a Virtual Learning Environment, VLE, a Moodle-learning platform, integrated with an ACE, that is Maple (www.maplesoft.com), an Automatic Assessment System (AAS) and a web conference system. The innovative methodologies proposed by the PP&S project are: problem posing and solving using an ACE that supports problem formulation, presentation, resolution and

generalization, and that allows the creation of interactive materials (Barana et al., 2019; Barana, Conte et al., 2019a); automatic formative assessment with adaptive questions aimed at teaching students how to solve problems, guiding them step-by-step with interactive feedback in the solving process, through an ACE and an AAS (Barana et al., 2020; Barana, Conte et al., 2019b).; collaborative learning among teachers in a community of practice for the exchange of ideas, strategies and materials (Barana et al., 2018); collaborative learning among students in a learning community. It is important to underline that the term "Online Teaching" does not only mean the virtual environment for the synchronous interaction between users (videoconference, chat and so on) but also the asynchronous learning (which does not require the presence of users at the same time). Within the DLE it is possible to deliver multiple types of resources such as videos, interactive files, pdf files, conceptual maps, links to external sites, collection of images and photos, podcasts, etc. Students can view the contents created with the advanced computing environment directly within the DLE and explore them interactively. This type of material is very valuable for STEM disciplines because it allows to view and explore mathematical situations (even with two and three dimensional and animated graphics) to study concepts effectively, to develop problem solving skills (and generalization of the solution process), and to develop modelling skills. Within the DLE it is also possible to create multiple types of synchronous and asynchronous activities: discussions, tests with automatic assessment, submission of tasks, sharing of materials, workshops, questionnaires, surveys, logbook, etc. Quizzes can have questions with automatic assessment and with interactive and immediate feedback. This type of questions allows students to carry out the necessary exercises independently, to have step-by-step guided solutions to learn a method, and to make repeated attempts of the same exercise with different parameters and values. This activity promotes students' autonomy and awareness of their skills and facilitates class management for teachers. All activities within the DLE can be carried out alone or in a group and support students' collaborative learning. As stated before, all activities can be evaluated: by the teacher, by the student himself (self-assessment) and by the other students (peer evaluation). All teachers enrolled in the PP&S can request the opening of one or more courses on the platform to work with their students and through the helpdesk service they require the accreditation of the students on the platform. Each user of the platform can open a ticket to the helpdesk service at any time to get support for access problems, to get information or help in using the platform. Teachers can customize their DLE as they prefer and design the activities and resources for the students. Within the Teacher Community, which includes teachers from all over Italy enrolled in the project, there are many materials for self-training (interactive materials, training modules, video pills, pdf, etc.) and database of materials for sharing between teachers. The sharing of teaching material is the basis of the project, as well as the sharing of ideas, good practices and teaching methodologies through forums.

Analysis of needs and considerations on online teaching during the covid-19 emergency

To analyse the needs of the teachers during the emergency period, an optional questionnaire inside the DLE was submitted to the teachers to understand if the teachers had already practiced online teaching, if the teachers had already used the new technologies, and which activities and resources they consider most useful for their teaching. We also asked to express their thoughts and experiences on their teaching in the covid-19 time and how their experience was within the PP&S platform. The needs survey showed that 48% of the teachers already practiced online teaching even before the emergency and 90% of the teachers used the technologies for teaching even before the emergency. 44% of teachers have been enrolled in the PP&S for less than 3 months (enrolled during the emergency), 10% of teachers have been enrolled for more than 5 months and for less than a year, 12% have been enrolled for two years and 34% have been enrolled for 3 years or more. The teachers were asked how important they consider various tools related to online teaching with students, expressing a score on a scale from *1 = not at all* to *5 = a lot*. According to teachers all the tools are important, but the most significant ones are video conferencing (to be able to communicate with students and deal directly with them), interactive resources and tests with automatic assessment. The teachers were also asked how much they agree on several statements regarding online teaching with students (on its effectiveness, on the participation of students, etc.) by expressing a score on a scale from *1 = not at all* to *5 = a lot* (Table 2). Most teachers agree that effective online teaching is also possible and that this type of teaching stimulates the development of additional skills in students. The teachers also agree on the need to have material available and to receive more training.

Teacher support for online teaching during the covid-19 emergency

At the end of the needs analysis and the analysis of the teachers' considerations, a first phase of support for the teachers was prepared, in the delicate moment of approach to online teaching and first knowledge of the tools. To respond to the most immediate needs and to offer support as quickly and effectively as possible, the following actions have been implemented: three weekly online synchronous meetings lasting one and a half hours (in some cases repeated) with a part of explanation and a part dedicated to answering questions. The meetings focused on several topics such as the use of the DLE, the automatic assessment system, the design of collaborative activities; forum to be able to express any doubts and receive an immediate response; enhancement of the Helpdesk service and email management to answer promptly to all requests; enhancement of the database of ready and available materials; enhancement of self-training material (always available to teachers).

Table 2: Reflection by teachers on the importance of online teaching tools with students

Online lesson preparation takes longer than face-to-face lessons	4.4
Online teaching stimulates the development of additional skills in students	4.2
Teachers would need resources available for online teaching	4.2
Teachers would need more support for online teaching	4.1
Online teaching should also be used in ordinary teaching	3.9
The participation of my students from home is active	3.8

All these actions offer basic literacy and initial training; very practical and directly usable. In this phase it was essential for the teachers to have constant support from the tutors and to share teaching practices and advice between the teachers of the community. In addition, online extracurricular activities were organized for students to increase their engagement: a mathematical competition on Pi Greco Day and disclosure of materials and quizzes on Dante Day. This support phase actively involved about 200 teachers during synchronous online meetings, but many more teachers on the platform in the teaching community. Table 3 shows data about users in the PP&S between the period Pre Covid-19 (01/09/2019 – 29/02/2020) and during Covid-19 (01/03/2020 to the present date, written in the table caption). These numbers do not only show an increased access to the platform, but they also indicate active engagement and collaborations in the Community of Teacher forum. The collaboration of the teachers on the platform to overcome this emergency was particularly important and significant. The teachers discussed a lot about how to best propose an online teaching, to carry out synchronous online lessons and how to prepare relevant materials and resources. The teachers collaborated mainly through the forum of the Teacher Community (Table 4), where each teacher can open a discussion, write an intervention in a discussion already present or simply consult the forum. The ever-present support of the trainers was also fundamental. The statistics about the usage of the whole platform (Table 3) show a significant increase which proves the effective utilization of the e-learning tools.

Table 3: Comparison between Pre and During Covid-19, last update May 28, 2020

	Pre Covid-19	During Covid-19	Increase
Period	01/09/2019 - 29/02/2020	01/03/2020 up to date	
New users	1466	2924	+199%
Average of new users per day	11	38	+239%
Average login per day	4875	8418	+73%
Average distinct user login per day	117	1289	+1001%
Educational resources created	375	3199	+853%
Educational online activities performed	159773	2778638	+1739%
Grades received by students	1630	4266	+262%

Table 4: Data from the Teacher Community forum Pre and During Covid-19, last update May 28, 2020

	Pre Covid-19	During Covid-19
Period	01/09/2019 - 29/02/2020	01/03/2020 up to date
Threads created	77	128
Threads read	2203	2877
Posts created	179	318

All the teachers have transformed their teaching into online teaching, structuring the course on the platform and inserting different types of activities and resources for the students. At this stage, the help of the most experienced teachers was certainly very important, in fact they gave valuable advice and constant help to colleagues who had just entered the project. A free online webinar on online education was also organized within the project, open to all interested people (teachers and non-teachers) organized in collaboration with the "Ragazzi Connessi" Project of Genoa. Lastly, we would like to underline that the IT infrastructure was not adapted in response to the new users load in any way: the high-performance and high availability solution (Baldoni et al., 2011) adopted for the PP&S service was able to serve the bigger numbers without affecting the user experience.

Teacher training for online teaching during the covid-19 emergency

Starting from the month of May, when most of the teachers were regularly teaching online, a phase of teacher training began (still in progress). The objective of this phase is to offer training that allows teachers to develop skills also from a post-covid perspective, to rethink their teaching in order to integrate online teaching into their future face-to-face teaching or to practice blended teaching. It is particularly important to reflect on how new technologies can allow adaptive learning, thus supporting students' cognitive processes, increasing their involvement and allowing the inclusion of the most disadvantaged or disabled students (Erik Duval, 2017). First, a training module was proposed to the teachers, consisting of: 4 one-hour synchronous online meetings on important topics: the design of the virtual classroom environment; activities and resources for students' collaborative learning; online formative assessment, self-assessment and peer evaluation; adaptive strategies for personalized teaching and for monitoring the learning processes; creation by teachers of multimedia material for learning a specific topic; creation by teachers of an activity for assessment or collaborative learning; documentation on how the resource and the activity created are used by students. The training module will end in June, but training activities will also continue. At the end of the school year, additional questionnaires will be offered to teachers to collect thoughts on online teaching in the emergency period and on its impact on students.

Conclusions

After a first phase of needs analysis, the emergency evolved in a broad-spectrum training action: in a first phase of digital literacy for teachers and in a second, more advanced training phase. Both phases are characterized by the teacher's ideas on the necessary change of perspective about teaching during this emergency. As the results show, the participation of teachers in the training activities and the collaboration among teachers on the platform were relevant. Post-covid teaching will probably be a much more blended teaching (in attendance but also online). Doing online teaching now definitely allows teachers to acquire new skills and to prepare teaching materials that can be used in future teaching. Online teaching should be understood as an additive and not a substitute paradigm for classroom teaching. The teachers of the PP&S will certainly have an advantage and will be able to take advantage of the work done and the experience and skills gained. At the end of this school year, the activities carried out by the teachers and the participation of the students will be analysed in detail in order to understand the activities and resources that proved most effective. Further investigations will also be carried out on teachers and their students on online teaching during the emergency and on the use of the platform. Such a strong action of supporting and training to teachers of the secondary school was made possible because the PP&S was an already consolidated reality that in the emergency has expanded its range of action in order to turn an emergency into an opportunity for the future.

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