Strengthening Teaching Competences
in Higher Education
in Natural and Mathematical Sciences

Co-funded by the
Erasmus+ Programme
of the European Union

Report 4.1 The integration of online technologies into traditional courses

October 2022

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Project acronym:	**TeComp**
Project full title:	**Strengthening Teaching Competencesin Higher Education in Natural and Mathematical Sciences**
Project No:	598434-EPP-1-2018-1-RS-EPPKA2-CBHE-JP
Number of grant contracts	2018-2467/001-001
Web address of project	www.tecomp.ni.ac.rs
Funding Scheme:	Erasmus+
Coordinator Institution:	University of Niš
Coordinator:	Prof. dr. Jelena Ignjatović
Project duration:	15.11.2018. – 14.11.2022.
Work package:	**WP4 – The formation of online learning environment**
Lead organization of WP4:	P3 – UNS
Task 4.1	The integration of online technologies into traditional courses
Version of the document:	v.03
Status:	Final Draft
Dissemination level:	Internal

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Content

WP4 The formation of online learning environment

4.1 The integration of online technologies into traditional courses

The aim of this activity was to deliver a certain number of pilot courses within which the integration of online technologies will be performed in support of traditional teaching. However, due to the problems in teaching in the traditional way, which arose as a result of the Covid 19 pandemic, online technologies have been integrated into all university courses in different ways and to different extents.

In other words, due to the Covid-19 pandemic, we did much more than planned.
In most universities, during periods of the highly active pandemic, all classes in all study programs were organized online. The know-how that we gained during seminars organized by our EU colleagues was extremely important and teachers who participated in the seminars were prepared in advance for the online teaching and got important knowledge that was immediately used in practice.

Periods when the teaching was organized online:

2nd semester 2019/2020,
1st and 2nd semester 2020/2021,
1st and 2nd semester 2021/2022.

At the beginning of the pandemic usually, there was not some strict rule on which platform or which way of communication with students to practice; the choice was to professors and students. Later, in some universities, it was decided to use some specific platform (mostly Microsoft Teams and/or Moodle platform).
Finally, professors who participated in the TeComp training used TeComp's LearningKey platform that was constructed under the project.

Platforms that were used were:
Microsoft Teams platform
Moodle platform
LearningKey platform
In a smaller amount:
Google Classroom, Google meet
Zoom, Skype, Whatsapp, Viber
The Big Blue Button

In the sequel, there is information about the project partners from Serbia and Albania in connection to the situation with online teaching during pandemics.

1. University of Kragujevac

Pilot courses delivered (courses delivered using online technology)

Faculty of Science, University of Kragujevac, has provided access to Microsoft Office 365 to staff and students for the past several years. That includes the Microsoft Teams platform as well. Besides Microsoft learning tools, Department for Mathematics and Informatics incorporated Moodle platform in its portal. Both e-learning environments were available for more than 7 years, but their usage became intensive and more systematic after March 2020 when the COVID-19 pandemic reached Serbia.

2nd semester 2019/20

During the lockdown, from 15th March to 6th May 2020, all classes in all study programs were organized online. This means that approximately 1200 students participated in distance teaching and learning. There was not some strict rule on which platform or which way of communication with students to practice; the choice was to professors and students. The most frequently used tools were Moodle, MS Teams, Google classroom, GitLab, Slack, Skype, Zoom, Big Blue Button, and Viber. Most classes were conducted online in real-time, where direct interaction with students was enabled and encouraged. Depending on the different situations with equipment and internet connection availability and quality, some professors created video lectures and published them on LMS, MS Teams, Google classroom, or Moodle. Consultations were organized in real-time (Zoom, MS Teams, Big Blue Button, Viber) and through asynchronous communication tools (forums, chats, e-mail). Faculty of Science does not have accreditations for online examining, but on some courses, additional periodic online student evaluations were organized in order to keep students focused and improve their engagement. After the end of the lockdown, only the most important experimental exercises were organized at the faculty's laboratories.

1st and 2nd semester 2020/2021

Because of the serious situation of pandemics during the whole school year, lectures were conducted online, except for experimental exercises, which were dominantly conducted by faculty in laboratories. After the one-semester experience with online

teaching, some rules were adopted. Two platforms were recommended, MS Teams and Moodle. Each faculty staff member had an obligation to use an official Microsoft Office 365 account and an official faculty e-mail for professional communication was created for each student (approximately 1200 students). Also, Microsoft Office 365 account and faculty e-mail in a standardized form. All courses were organized in teams where online teaching materials (books, scripts, videos, and presentations) were available and usually, all communications with professors, assistants, and students took place there, and sometimes by e-mail. In some courses, there was online homework and test with appropriate feedback. Student evaluation (survey questionnaire) of the teaching and learning process during this school year shows that students highly appreciated the availability of different kinds of teaching material, specially recorded lectures, and exercises. Students witness that this gives them the opportunity to learn with its individual tempo. Interaction between professors and students during online classes was characterized as the weakest point of online classes, both among students and professors.

1st and 2nd semester 2021/2022

The pandemic situation continued to be serious throw autumn of 2021, therefore the 1st-semester lectures were conducted online, except for experimental exercises in laboratories, which were organized by faculty for students grouped in small groups. Platforms MS Teams and Moodle were dominantly used. Professors who attended the TeComp training registered a few courses (with approximately 90 students involved) on the TeComp's LearningKey platform. Their observations and comments on platform usability were to improve the platform's performance and features.

During the 2nd semester situation with the pandemic was significantly improved, so professors and students returned to classrooms at faculty. However, good teaching and learning practices adopted during the online teaching period were not excluded. In almost all courses students are invited to teams where they can find teaching materials, some new and some from previous school years. Additional consultations, homework, self-evaluations tests, and feedback on project assignments were conducted within MS Teams, Moodle, or the LearningKey platform. It is natural to suppose that this will be one of a few good things that we adopted during the pandemic. Teachers who have used the LearningKey platform have presented their experience and attitudes about its usability to a broader teacher audience, which resulted in a bigger interest from the teaching staff. Therefore, a number of registered courses on the LearningKey platform were raised. Feedback from teachers newly engaged in Learning Key with broader student groups will contribute to platform features refinement and improvement.

2. University of Niš

For more than 15 years, the Faculty of Sciences and Mathematics of the University of Niš (FSMUNI) has signed an agreement with Microsoft that allows students and staff to use Microsoft Office 365 and some other Microsoft software. This includes Microsoft Teams as well, but it was not used until the beginning of the Covid 19 pandemic. However, since the very beginning of the Covid 19 crisis Microsoft Teams began to be used at FSMUNI as the primary online learning platform. FSMUNI also has a license for the Zoom platform, which is also used by some teachers, as well as the free Google Meet platform.

Integration of online technologies during the Covid 19 pandemic

Summer semester 2019/2020

The summer semester of the academic year 2019/2020 began in mid-February 2020 and was initially taught in the classical way, with the use of technical aids. However, on March 15 the Government of the Republic of Serbia introduced a lockdown, as well as a decree which suspended classical teaching in primary and secondary schools and universities, and all schools and faculties were forced to completely switch to online teaching. FSMUNI management decided to continue the teaching and learning process online, Microsoft Teams was chosen as the primary platform through which online teaching and learning was conducted at the faculty, but teachers and teaching assistants were left free to use some other platforms, and they were also used Zoom, Lifesize, Google Meet, Cisco Webex, TeamViewer and others. FSMUNI purchased the Zoom license, while the Lifesize subscription was paid for through the TeComp project. In cooperation with Microsoft Development Center Serbia, training was held for the use of MS Office 365 (with emphasis on Teams, Forms, Skype, etc.) and other platforms for remote work, intended for teaching and administrative staff of FSMUNI. A guide for using the MS Teams platform was also developed.

Lockdown was revoked on May 7, 2020, after which theoretical classes were still held online, while practical exercises in laboratories were held face-to-face (of course, in compliance with the prescribed measures for protection against Covid 19 infection). As the study programs of FSMUNI are not accredited for complete online learning (such accreditation is done according to a special procedure and special conditions must be met), the faculty did not have the right to conduct online exams during the lockdown, but some pre-examination obligations included online testing. After revoking the lockdown, all exams were conducted face-to-face, including exams that were not held during the lockdown.

Winter and summer semester 2020/2021

At the beginning of the 2020/2021 academic year, the situation with Covid 19 was somewhat more favorable, but it was still not good, which is why classes continued to take place online. The exception was the teaching in the first year of study, which was initially performed face-to-face, while students who could not physically attend classes (there were also those Covid 19 infected) were allowed to attend those classes online. However, in the middle of the winter semester, the situation with Covid 19 worsened, and for that reason, first-year students also had to switch to online teaching. Complete online teaching lasted until the end of the winter semester and throughout the summer semester of the academic year 2020/2021. Practical exercises in laboratories were still held face-to-face. All exams were taken face-to-face, but some pre-examination obligations included online testing.

Winter and summer semester 2021/2022

Teaching in the academic year 2021/2022 took place in exactly the same way as in the academic year 2020/2021, until the middle of the summer semester, when all Covid 19 measures were revoked, and the teaching regime returned to that before the Covid 19 pandemic.

Deeper integration of online technologies

Therefore, during the Covid 19 pandemic, online technologies were more or less integrated into all courses offered by FSMUNI. In some courses, which we called pilot courses, that integration was more serious and deeper. These are mostly courses set on the LearningKey platform and listed below.

	Subject	**Study program / level of study**
1.	Data structures and algorithms	Computer science / Bachelor studies
2.	Mathematics 1	Computer science / Bachelor studies
3.	Mathematics 2	Computer science / Bachelor studies
4.	Mathematics 2 - Practical Classes	Computer science / Bachelor studies

5.	Linear Algebra	Computer science / Bachelor studies
6.	Linear Algebra - Practical Classes	Computer science / Bachelor studies
7.	Design and Analysis of Algorithms	Computer science / Bachelor studies
8.	Design and Analysis of Algorithms - Practical Classes	Computer science / Bachelor studies
9.	Discrete structures I	Computer science / Bachelor studies
10.	Cryptographic algorithms	Computer science / Master studies
11.	Web programming	Computer science / Bachelor studies
12.	Linear Algebra (Mathematics)	Mathematics / Bachelor studies
13.	Introduction to differential equations	Mathematics / Bachelor studies
14.	The methodology of teaching mathematics	Mathematics / Master studies
15.	Introduction to Environmental Chemistry	Chemistry / Bachelor studies
16.	Chemodinamics of pollutants	Chemistry / Master studies
17.	Chemistry of Water and Soil	Chemistry / Master studies
18.	Humic substances in the environment	Chemistry / Master studies
19.	Laboratory analysis of water and soil	Chemistry / Master studies
20.	Advanced Environmental Chemistry	Chemistry / Master studies
21.	Advanced Environmental Chemistry - Problem Solutions	Chemistry / Master studies
22.	Mechanics (Mehanika)	Physics / Bachelor studies

23.	Teaching Aids in Physics	Physics / Master studies
24.	Multimedia systems in education	Pedagogy / Bachelor studies
25.	Didactics 1	Pedagogy / Bachelor studies
26.	Didactics 2	Pedagogy / Bachelor studies
27.	Andragogy	Pedagogy / Bachelor studies
28.	History of pedagogy 1	Pedagogy / Bachelor studies
29.	History of pedagogy 2	Pedagogy / Bachelor studies
30.	Contemporary educational trends	Pedagogy / Bachelor studies
31.	Pedagogy	English Language / Bachelor studies
32.	Pedagogy	History, Sociology / Bachelor studies
33.	Pedagogy	Philological studies / Bachelor studies

In the mentioned courses, either the whole course or a part of it has been innovated in accordance with modern pedagogical and methodological principles and with the abundant use of new technologies. Many of these courses offer short videos that visualize and further clarify the subject matter. This is especially useful for courses dealing with abstract concepts, such as most courses in mathematics and computer science.

3. University of Belgrade

The University of Belgrade consists of more than 30 faculties, and the Faculty of Biology, the Faculty of Physics, and the Faculty of Mathematics participate in the TeComp project. More than 30 junior teachers and teaching assistants from the mentioned three faculties of the University of Belgrade attended various courses organized by higher education institutions from the partner countries participating in this project. All of them implemented the newly acquired knowledge and skills in the courses in which they were engaged, and it was of great help that the University of Belgrade a few years ago enabled the use of various software platforms for the implementation of distance learning.

As far as the Faculty of Biology is concerned, teachers have had Google Classroom and other Google platforms at their disposal for many years, the use of which has significantly intensified since the beginning of the COVID-19 virus pandemic and the general transition to online teaching. Thus, this software platform was used to distribute materials created through courses such as "Educational Interaction and Communication in Higher Education" or training organized by colleagues from the University of Banska Bystrica, Oviedo, Granada, and Ostrava. In this way, more than ten courses at the basic, master's, and Ph.D. levels of study were improved at the Faculty of Biology, University of Belgrade, including courses in animal physiology, endocrinology, genetics, morphology, and phylogeny of animals, botany,… Students reacted very positively to poster creation and interactive video material for the purpose of mastering the material, as well as the introduction of short questionnaires related to the teaching units that were covered in the courses. The total number of students who participated in the mentioned courses was about 100 per course per year. Also, as described in the material "Strengthening Teacher Competences - Digital Competences", ideas for modernization of teaching and learning biology were proposed, which enabled a part of the experimental work in the field of physiology and endocrinology to work remotely. The students showed interest in this approach to teaching, and the experimental exercises significantly contributed to the understanding of the planned material. The number of students who participated in performing such experimental work was about 130 per year. A special contribution to improving the quality of teaching was given by the software platform LearningKey, which we started using in the winter semester of the school year 2021-2022 with a smaller number of students (about 30) in master's studies. The platform has proven to be very useful in distance learning, so it is now in use in a number of courses and with more students with the potential to take its place as a tool for choosing teachers in everyday teaching.

The Faculty of Physics educates students through four study programs, General Physics, Theoretical and Experimental Physics, Computer and Applied Physics and Meteorology. Each program has two levels, undergraduate and master. In the transition period, until the covid pandemic situation, the teaching staff had the opportunity to use the Moodle platform. The pandemic period has increased interest in the use of digital

learning and teaching platforms, as well as packages for creating educational content for students. Google Classrom found to be the most used platform. Also, Zoom as well as The Big Blue Button were often used during the pandemic period. The development of the Key Larning platform, as an additional opportunity, has proven to be very useful in such conditions. From the Facilty of Physics 10 teachers and associates attended the trainings in the frame of project Strengthening Teaching Competences in Higher Education in Natural and Mathematical Sciences. As particularly useful participants found the training for the design of short video materials (Camtasia and Edpuzzle). This knowledge is applied in courses Pedagogical Research in Physics and Applied Methodology of Teaching Physics, intended for students of General Physics, which educates future physics teachers in schools. Poster design is also very important from the point of view of highlighting key content. Making posters is also part of the content of the course Pedagogical Research in Physics. Each of the mentioned courses is attended by 3-6 students per year. Organizing teaching through group or teamwork, and thorough student collaboration has a special place in modern teaching. Managing these forms of work in school is of particular importance for students who are future physics teachers. The knowledge gained by the participants in the trainings is implemented in the courses Methodology of Teaching Physics 1 and Methodology of Teaching Physics 2 for students of General Physics. Each of the mentioned courses is attended by 3-15 students per year. Conceptual learning has a special significance in the teaching of physics at all levels. Properly asking conceptual questions, according to the principles of constructivism, as well as designing such questions and possible answers, are of particular importance. The knowledge gained in the training related to this topic is implemented in the already mentioned courses, but also in most courses in all study programs (General Physics 1-4). Also, these contents have been implemented in the course Education Standards for students of General Physics. Laboratory work is very important in physics. The conditions of the pandemic motivated teachers to design the laboratory e – classes. Teachers and associates at the Faculty of Physics have begun to develop this kind of laboratory work. In the coming period, the syllabus of the subject Modern Teaching Tools should be upgraded with such content. This course is attended by up to 5 students per year. The development of competencies in the use of English in teaching and research is of particular importance in the work of university teachers. For that reason, teachers and associates of the Faculty of Physics have started training related with this. All participants have positive experiences with the realized trainings. It will take some time to assess the real impact of knowledge application on student content. Nevertheless, the analysis so far has shown a positive response from students on impemented novelties.

Faculty of Mathematics was introduced to this project first through several online workshops and later two on-cite workshops. All the workshops were very well organized, with lots of tools and useful tips. Use of online tools was in the focus of most of lectures. Online lectures that came with Covid pandemic, gave us an opportunity to analyze dangers of multitasking and an opportunity to extensively use constructive

approach when working with students. Within Oviedo lectures, we were introduced with very useful open-source software for making video lectures: OBS Studio and Open Shot Editor. Those programs became part of our everyday practice while making video lectures. We used those programs extensively in the following years and plan to use them in the future. They introduced us to the free-lincence web platform Edpuzzle, which we used with our students (future professors of mathematics and informatics, and future programmers and matematicians) for several of theirs projects. Within Gent 12-week course “Educational Interaction and Communication in Higher Education”, we learned a lot of solutions to the existing problems of online teaching. Especially feedback and feedforward concept of proposing changes in students work. We applied all those tools on several courses that are taught on IV year of studies on Faculty of Mathematics, University of Belgrade, approximately 200 students a year. Students reactions were very promising, theirs projects were very well prepared, interaction within students was increased during the course, they learned to give constructive and positive comments when listening to other students presentations. Overall students, and teachers, are very pleased with the results.

4. University of Gjirokastra

"Eqrem Cabej" University of Gjirokastra, has provided access to Microsoft Office 365 to staff and students for the past two years. That includes the Microsoft Teams platform as well. Besides Microsoft learning tools, Faculties have also used other platforms intensively during the pandemic situation, such as Zoom, Google Classroom, Google Meet, Whatsapp, etc. Although in unusual circumstances, facing a new reality for Albania, educators and students worked hard to take full advantage of the new and unique opportunity of online learning.

2nd semester 2019-2020

"Eqrem Cabej" University of Gjirokastra has regularly offered only in-person programs for its 1400 students enrolled in all study programs. Online teaching has not been a practice before the pandemic situation. Found unprepared in conditions of total isolation, unable to train teachers and students to teach and learn online, during the second semester of the academic year 2019-2020, the Senate decided that the staff would use the online platform they considered the most appropriate to deliver lectures, seminars, laboratory work or other practical works. During the online learning, the conditions in which the students studied were taken into account. Since not all students had access to the internet, the lecturers not only conducted online lectures but they recorded and uploaded instructional videos on various online platforms such as Google Classroom, Google Meet, Zoom, MS Teams, Skype, Whatsapp, etc. Forums, emails and chats were used to encourage students' participation and engagement in the learning process. The evaluation process was also conducted online with the help of the features that the online platforms offer. Clean Score, a platform used in the framework of a project financed by AADF, was also used widely for the summative assessment. In this way the students were acquainted with the results in real time and in a transparent way.

1st and 2nd semester 2020-2021

With the deterioration of the pandemic situation, the academic year 2020 – 2021 was attended entirely online. Having the experience of a previous semester, it was easier for teachers and students to adapt to the online process. This time MS Teams was the mandatory platform, by decision of the Senate, to facilitate the learning process.
Office 365 package was used for official communication via email in Outlook within the University as well as for storing One Drive documents for academic staff and students. User manuals were made available to staff and students on the official website of the university.

Instructional videos or recordings of online classes continued to be available to students who, for various reasons, were unable to attend certain online classes.
The whole process starting with lectures, seminars, assignment evaluation, laboratory and practical hours and formative evaluation were made possible online. The summative assessment continued to be carried out online via Teams and even Clean Score platform which boosted the student's credibility and facilitated the pedagogue's efforts regarding the correction of the summative tasks. Among other things, students were given access to JSTORE library, a golden opportunity to utilize the necessary literature from home. Online learning made it possible for students to learn at their own pace, choosing the most appropriate time to study. Instructional videos and other recordings gave them the opportunity to follow the explanatory material more than once which did not happen in physical learning.

1st and 2nd semester 2021-2022

The pandemic situation improved by the autumn of 2021, so Albanian universities opened their doors to students and the learning process began normally, consequently both the autumn and spring semester were attended physically. Being to school, students had the opportunity to become, once again, involved in physical engagements (lectures and seminars in auditoriums, group discussions in the classroom, live experiments, etc) with their professors and classmates.
However, the experience gained during online teaching/learning was not totally avoided. Students can still have access in instructional or experimental videos, lectures, assignments and assessment tests on the MS Teams compulsory platform. They can also find and deliver their assignments on this platform.
Most of the professors still use Clean Score to conduct and evaluate summary tests. Students can still take advantage of the opportunity to search and research in the online JSTORE library.
The professors who are members of TECOMP project working group, part of the Department of Information Technology and the Department of Education and Teaching Methodology are preparing to deliver their lectures online through Key Learning platform, developed on the framework of the project. Based on the experience of the last two years, both professors and students will find it easier to organize the elements of online classes and will work to further benefit from the opportunities offered by distance learning.

5. University of Novi Sad

From the University of Novi Sad, The Faculty of Science participates in the TeComp project.

During the lockdown, in the second semester of 2019/2020, from 16th March 2020, all classes in all study programs were organized online. During the 2020/2021 and 2021/2022 school years, some of the classes were organized face-to-face in some periods with low pandemics. But still, the teaching of the majority of courses was organized online.

For the communication of students mostly Moodle platform was used in the majority of courses. With the start of the pandemic, all courses at the Faculty of Science are implemented in Moodle. Besides Moodle, like some other universities at the TeComp project, the Faculty of Sciences, UNS has had access to Microsoft Office 365 for staff and students during the project duration, which includes the Microsoft Teams platform as well. Besides Moodle and Microsoft learning tools, we have mostly used other platforms intensively during the pandemic situation, such as Webex (purchased under another Erasmus+ project PPMA), Zoom, Google Classroom, Google Meet and others. Moreover, some of the professors who attended the TeComp training registered 11 courses (with 186 students involved) on TeComp's LearningKey platform.

All teachers were required to post material for lectures and exercises on the Moodle platform. This was mostly done, although there were some objections made by students that some teachers only put scanned notebooks from some previous years. The other forms of teaching depended on the agreement between the students and the teachers. It was not possible to make that uniform because our groups and the subjects themselves were very diverse. Groups in mathematics vary from about 5-10 students to over 50. In some departments where we teach there were more than 200 students (normally the students are divided into two groups, but now there was no need for that - 100 or 200 students require almost the same online teaching methods).

Practically all the students we unofficially and officially surveyed emphasized the need for direct communication with teachers. They stated that in this way they follow lectures and exercises much more efficiently (of course, those who did not have a good enough internet connection did not even comment on it – we do not know the number of these students, but it seems that it was quite low). Teaching material alone with email consultations or a chat on the Moodle platform was by no means enough. Some of the professors tried to do so, but we urged them to switch to some kind of direct communication. Direct communication means going through the material as in normal

lectures with a lot of comments and possible sketching (see note on this later). It was much easier for students than learning from the text on their own. It also included live consultations where the teacher could write or sketch something. Let us now describe computer programs that were used for that.

The computer programs used:

Video conferencing programs
Skype - the most popular communication program. In my opinion too demanding for computers, poor support for Linux, for example. This is a big drawback because Linux (along with Android in part) is the most common free operating system, stable and secure.

Zoom - the world's most popular distance learning program, but we worked with interruptions and without all its options because we did not pay the license. Screen sharing was possible for all participants. Also, its reputation was ruined for security reasons, but without influence on our teaching.

Webex - we had a paid commercial license, and more functionality consequently. But the problem is that students must have a registered email on the server. Otherwise, they could follow, but without presenting their material (screen sharing).

Programs based on screen sharing (or graphics boards)

FreeConferenceCall was popular with those who were using a graphics board (we had already done online preparation classes for the entrance exam, classes on applied statistics, so there were well-trained members of the department with graphics boards). Questions were asked in chat or by voice.

Discord was the most accessible on all platforms (even Linux), and in addition to screen sharing, video conferencing was also possible. It is free (up to 50 users), everyone can equally participate because the system is decentralized. It was especially convenient for sharing the screen - in addition to chat, voice, pictures, students could also share the screen.

Microsoft Teams is popular for windows users, it is more stable than FreeConferenceCall, with similar features as Discord.

Presentation methods.

We tried different things. Some of us used a camera and filmed themselves writing on a whiteboard. The others used a camera to record their writing on a paper (skype), and

some even combined: they filmed themselves with one camera and the paper with another. Some of us were going through a pdf presentation with comments made by basic sketches. A slightly more efficient way was a combination of pdf presentation and electronic pen writing on a tablet with some application (there are various "handwriting" applications, they are most efficient with low prices, up to about 10$ (because they are actually for personal use). Using such a method on a desktop or a laptop computer it was a poor replacement, more like a rough illustration. The already mentioned graphics boards with additional screen sharing are probably the most appropriate substitution for a real lecturing. With a camera, added one can have a feeling like in a real class.

But in all these possibilities, the most sensitive thing was the feedback of the students. Namely, at the lecture, the lecturer sees faces, hears mumbling (due to misunderstanding, mostly), immediately reacts when someone wants to ask something... There is simply no such thing here. Reading of student's writings in the chat takes a lot of time and a continuity of the teaching process is lost. The teacher can't watch faces even though he has a video connection to students because she/he should be focused on technology. In front of the board, the teacher acts much more naturally. That might be practiced, but again it is only possible to see a small number of faces on the screen compared to the classroom. The electronic raising of hands is practically useless due to the same reasons as for chatting - while the teacher sees the hand, the lecture has already moved away from the point to which the question referred for a few minutes ago. Voice interruption (especially if there are many students) can be unpleasant for both the teacher and other listeners because it comes unannounced while students are concentrated on adopting the material presented by the teacher. But it's still the best option, it seems. It is extremely important here how many students there are in the group. Some communication can be done well "on the fly" like in a real classroom only if there are few students, say about five or slightly more. For larger groups, the teacher should leave a period of a few minutes from time to time to allow a student to ask something about recently not quite well explained (or understood). That means a lot of silence periods which is not very pleasant psychologically and the rhythm of lecturing is slightly disturbed. The alternative is to collect all the questions for the next lecture, but that already exists in real teaching and that is not a substitution for the question on the fly: It is often very important for students to clarify a small fact to understand the lecture after that. Sometimes, a small problem can cause a student to stop following the lecture, even it could be easily solved by a sentence or two. Also, in the mutual conversation about the online lectures, we noticed several things that we had not paid attention to before. First, the preparation and conduct of online courses are much more demanding (both mentally and physically) than traditional ones. We did not find out the exact reasons yet. Maybe a teacher sends additional information with his/her body, facial expressions, or unconscious reactions apart from a voice and writing on board. There is no such thing here, everything looks like an imperfect computer is transmitting some knowledge to students. Because of that, breaks are

important and have to be frequent to establish at least elementary communication. The other thing is that the material can be presented much faster (maybe again due to lack of communication during a lecture, a teacher does not move, does not delete the board, ...). If a teacher does not pay attention to determine which part of the material he/she will teach (and this can only be done if she/he has been giving that course for some time because the groups usually differ quite from one year to another, or one study program to another, ...) or if students do not react, the teaching material will be very condensed. And that is quite the opposite of the fact that online teaching should be smaller in volume to reduce the "gray" area of the lecture, the one that is not completely understood. For that part, students are maybe not aware immediately, due to a lack of communication among them. A student is more alone than usual, so he/she does not have a real insight into how much he/she knows and how much he/she has understood. One needs a comparison with other students for realizing that.

Finally, it was very important to permanently post all online lectures and some consultations on the Moodle platform, because the number of students who were not able to attend direct classes is not negligible, either for technical or human reasons. However, it was a state of emergency, and we are not a country with an excellent internet network. That was one of the main students' wishes during this period. Some of them asked if they were allowed to do it from home (easily with any screen and sound capturing software if a teacher did not have the technical knowledge or equipment to do it).

The biggest problem, apart from the technical ones mentioned above, was the human factor. In this text self-evaluated data on teaching in this period based on the reports sent by the teachers will be presented. But the students were afraid to bring problems in public and specify what irritates them, so please take the report with some reservations. The most common problem was the inertia of some teachers (let's call it in that way) who convinced themselves that their students were not looking for direct communication, for example. For some reason, our students are scared to ask for something, so sometimes the teachers did not even know that they need to do something. (We have a lot of self-financing students who do not have to obtain "all" 48espb, so they only formally apply to some subjects without attention to really take them. It simply means that from a list of, say, 50 students, only 30-40 or even less are "fresh" ones, taking a course for the first time. The others just did not pass the exam last year and are waiting for a new chance this year. Older teachers were not allowed to come to the department (we extended the employment of almost everyone after the age of 65), and they did not have the technical equipment to do the online lecturing from home. Unfortunately, I have heard unofficially that some (assistants, it seems) have stated that "it is not their job to do more than setting up solutions and email communication (or chat)." But, in conversations with students, we think they were still satisfied with our effort in general.

Pre-examination tests were not performed in large and medium groups. There have been few experiments with fast responses via a computer program, but without much success. In small groups (about 5 students) it was much easier, and they were done. Mostly by doing homework which was very well accepted in that case. On the other hand, homework that was a means of better understanding the material was not so well accepted. Students complained that there was too much of it because "everyone was looking only at his/her subject" so it piled up and prevented them from following online lectures. This fact was also confirmed by the teachers, since for many, checking an electronic homework took much more time than a classical one with live communication with students. (Small pictorial description - the fastest way to get the most accurate answer is when you point your finger at something and ask, "Why is this true now?" or "How am I going to fix this?"). Perhaps the solution was to significantly reduce the amount of material. Namely, the suggestion from KONUS to reduce the volume by about 20% (which seems reasonable) came too late, because we planned to finish classes by May 15 so that students would have time to prepare for the remaining April examinations and regular pre-examination tests. So, most of us just said what students shouldn't prepare for this year's exam, even though it was already lectured.

Some approximate numerical data:
At least one of the teachers or assistants had regular direct online contact: about 90%. The rest of about 10% is unclear, several teachers said that no one responded for direct communication, which may be true. About 50% of the lectures took place practically on regular terms. Some divided the classes into parts (instead of 3 hours, 3 times an hour per week, but they stopped it because it was a burden for the students because they had to prepare themselves three instead of one time for a subject. About 10% is the number of those who had only consultations. I note that there are subjects where only that was needed (older generations of the students, for example). Less than 10% of pre-examination obligations were completed without coming to the faculty (seminar, homework, and student presentations.

Unfortunately, the student vice-dean organized a survey with a very low students' response and the conclusions were full or wrong information, there were even those that could be easily checked to be inaccurate. As already mentioned, one of the weakest points in this year online teaching was that the students did not dare or want to complain.

6. University of Korçë

"Fan S. Noli" University in Korçë has made it possible for all Faculties to provide online teaching platforms starting with the 2019- 2020 academic year. The Faculty of Natural and Human Sciences of Korçë University, has always used email as a tool to communicate and share study materials with the students. Following the Covid-19 pandemic situation several platforms became popular amongst the different departments of our faculty. Moodle, Google Classroom, Google Meet, WhatsApp, Zoom, Skype, eduMEET etc. were some of the platforms used at the beginning of the pandemic. By the end of the pandemic, MS Teams was the only platform used by all University. The last academic year (2021- 2022), some teachers got to know and try out a new teaching platform thanks to the TeComp Project, *LearningKey*.

2nd semester 2019- 2020

During the lockdown, from 16th of March to 29th of May 2020, all classes on all study programs were organized online. There was not some strict rule on which platform to use or how to communicate with the students. It was up to each professor to choose what was more appropriate for their course. The most frequently used tools were Moodle, Google Classroom, Google Meet, WhatsApp, Zoom, Skype. Lectures were mostly conducted online in real-time (on Zoom, Google Meet etc.). Sometimes they got recorded and then published on Google Classroom, or send by link via email.

The Faculty of Natural and Human Sciences mentions online teaching as a teaching method in its regulations. But, same as all Albanian Universities, Korça University does not have accreditations for online examining. Therefore, most of the exams in June 2020 were held in the auditorium. However, during the online teaching additional assessment tasks were organized in some courses. This had the intention to stimulate students to attend online classes and to make them more active. These tasks improved students' engagement and helped their exam results. Also, two weeks before the exams (1st to 12th of June) courses for the revision of the knowledge gained during the online course were held on site for some courses in our faculty. During the same two-week period, some of the laboratory classes were conducted with the students in the laboratories of the faculties.

1st and 2nd semester 2020- 2021

Because of the serious situation of the covid- 19 pandemics during the 2020- 2021 academic year, all classes were conducted online. UNIKO now being more experienced in online teaching, adopted some new. One unique platform was used, it being MS Teams. Each staff member was provided with an official Microsoft Office 365 account and official faculty e-mail in Outlook. Also, for each student a Microsoft Office 365 account and faculty e-mail was created fallowing the same standard. All courses were organized in *MS Teams*, where online teaching materials (books, videos and presentations) were uploaded. It also served as a platform where the communications of the students with the professors took place.

With this platform, teachers and students' communication was more organized. The platform made it possible to check on students' knowledge in different ways. *MS Forms* was a tool of this platform which created the possibility not only to test students with quick tests but also to receive feedback from them in real time for different issues of the course. Moreover, MS Teams created the possibility to add evaluation rubrics to the course assignments, which also helped the students to make a self- evaluation of their work.

At the end of the academic year, the students of our faculty gave an evaluation of the teaching and learning process during online learning via survey. They "graded" the quality of the learning material and the efficacity of the used tools with points 1 to 5. As shown in figure 1, most of the students were pleased with the amount, diversity and quality of the teaching materials and have evaluated the efficiency of the online tools with maximum points.

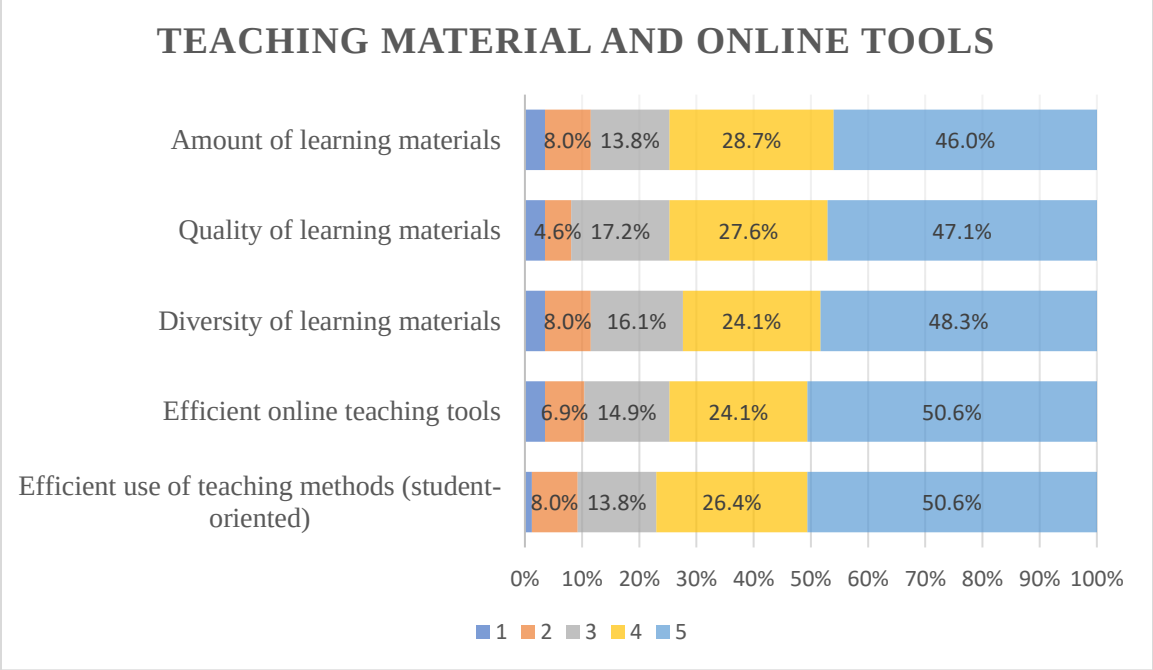

Figure 1

1st and 2nd semester 2021-2022

By October 2021 (the start of the academic year) the situation of the covid- 19 pandemic was significantly improved in Albania. So, the Albanian Ministry of Education and Sports, in accordance with the Ministry of Health, allowed professors and students to return to on site teaching and learning. Even so, The Faculty of Natural and Human Sciences did not abandon the good practices of the pandemic year. MS Teams continued to be part of the teaching process on almost all courses. It was used again a way to share teaching materials, assign homework and of course to communicate with the students.

With this regard, teachers who were presented with the LearningKey platform, started to get familiar with it, but its use was limited.

Conclusion

Teachers from all 4 universities in Serbia and 2 universities in Albania that participated in TeComp project were successful to implement online teaching during the period of the pandemic. Many of the teachers of those 6 universities participated in seminars that were organized under the TeComp project by EU colleagues and project participants in 2019. Some of the gained knowledge was essential in the pandemic situation when online teaching was rapidly and unexpectedly introduced as the obligatory way of teaching.

An additional important aspect of the project is the LearningKey platform, which is constructed under the TeComp project and is used by project participants and their students. A report on courses that are implemented within the LearningKey platform is given within Activity 3.7.

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Co-funded by the
Erasmus+ Programme
of the European Union

This project has been co-funded with support from the European Commission. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein