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Research article

The use of ICT during lockdown in higher education and the effects on university instructors

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ABSTRACT

During the pandemic, the Higher Education Institutions of Greece used Information and Communications Technologies (ICT) to an unprecedented degree to respond to the requirements of distance education and research work. The aim of this article is to present the main results of a nationwide quantitative survey that involved 1183 participating university instructors, to capture the impact of the use of ICT and its effects. Results show that, whereas the overall assessment of emergency remote teaching is positive, it seems that instructors have been challenged by the extreme use of technology. Women were mostly influenced, while age didn't have an impact. Significant differences among the participating university institutions were also discovered.

1. Introduction

During pandemic outbreak in March and April 2020, universities in western and developed countries like Greece (CEDEFOP, 2020; Papaioannou, 2021), as well as in emerging and developing countries (i.e. Tiwari et al., 2021; Basilaia and Kvavadze, 2020; Bond et al., 2021; Noori, 2021; Toquero, 2020) managed to adapt and continue their work. However, the level of teaching staff readiness is diverse (International Association of Universities survey: Marinoni et al., 2020; EU NESET report: Farnell et al., 2021), and the interruption of the normal flow of the educational process was not dealt with in the same way in all countries and at all levels (UNICEF, 2020; UNESCO, 2020; United Nations, 2020; Schleicher, 2020; Bilesen, 2020; Rizvi, 2020). If this crisis had occurred a few decades ago, probably there would have been no way to continue the educational process. Today, with the help of ICT, the traditional in-person process was urgently transformed into online remote teaching, despite the fact that there was no previous relevant experience. Only a few institutions, such as the Hellenic Open University - EAP (www.eap.gr) in Greece, offered distance undergraduate and postgraduate programs before the pandemic.

Under normal circumstances, university instructors complete multiple tasks, such as face to face teaching, student support, preparation of teaching material, research activities etc. According to Goodyear and Dimitriadis (2013) professors act as both "constructors and actors". During lockdown instructors should adapt and use online tools, some of them for the first time, to respond to the new challenges of the educational process (Rapanta et al., 2020).

Compared to traditional classroom-based teaching, the reliance on computer mediated communication of online education creates a unique environment that alters the interaction between learners, between the learners and instructors, and between the learner and the content of the course (Moore, 1993). However, the emergency of remote teaching due to the pandemic, created a situation that cannot be explained using established online education theories such as the Theory of Community of Inquiry (CoI) (Garrison and Archer, 2007), the Wisdom Communities model (Gunawardena et al., 2006), or the Theory of Transactional Distance (Moore, 2007). The current circumstances of emergency remote teaching are quite different in many aspects, and need further investigation (Hodges et al., 2020).

Furthermore, it is widely acknowledged that the psychological climate at work is strongly related both to organizational- and individual-level outcomes (Gorozidis et al., 2021), determining organizations' operation and their members' functioning (Kuenzi and Schminke, 2009). This situation was disrupted during the lockdowns, where home became instructors' workplace. Hence, instructors had to deal with several new issues, and at the same time to display "teaching presence", which includes learning design and organization, facilitating discourse and instruction (Anderson et al., 2001).

Literature concerning the assessment of the impact of Covid-19 pandemic on teaching and learning is based on three major

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perspectives. Firstly, from the higher education institution's perspective, secondly from the teaching staff's perspective, and thirdly from the student's perspective. Most relevant surveys focus on the immediate response and short-term impact of the emergency distance learning and education on students (i.e. Chirikov et al., 2020, He and Xiao, 2020; Kamaludin et al., 2020; Bond et al., 2021; Tomasik et al., 2021, Zagkos et al., 2022, Fuchs, 2021), instructors (i.e. Gatti et al., 2020), or institutions (i.e nationwide for USA: Inside Higher Ed., 2020; Global level: Marinoni et al., 2020; European level: Gatti et al., 2020). The same holds for cross cutting surveys, like i.e. Farnell et al. (2021) and Tartavulea et al. (2020).

The current survey focuses not only on the short-term impact of the emergency distance education in Greek Higher Education Institutions (HEIs), but extents to aspects which may have influenced daily practice, psychology, and emotions of teaching staff related to the first and second wave of Covid-19. There is no such survey in a nationwide frame discussing the obstacles teaching staff had to overcome, and the difficulties they faced due to the lack of time to adapt. Among the challenges the teaching staff encountered, the current survey focuses on the experience from teaching (research, and personal level being the other two).

2. Research methodology

2.1. Scope and aims

The aim of the present study is to explore the level and impact of technology usage from university instructors during lockdown. The research questions investigated are the following:

1. Which technological instruments, both hardware and software, were mostly used?
2. What are the attitudes of instructors regarding emergency remote teaching, as well as the distance education prospects?
3. Which difficulties instructors encountered due to their reliance on technology?
4. Is there any significant impact of demographic factors on the difficulties instructors faced?
5. Do instructors' attitudes correlate to the difficulties expressed?

2.2. Population and sampling

The total number of instructors on the 25 Greek universities is 12744, according to the Hellenic Statistical Authority.[1] For the scope of the research 8700 emails containing the link of the electronic questionnaire were sent on the instructors' academic accounts. A total of 1183 questionnaires were completed from February 18 to the end of March 2021, resulting in a 13.6% response rate. The sample is convenient and random, and represents the 9.3% of the entire population.

2.3. Research method and tool

The questionnaire consists of four sections. The first section contains five demographic/general questions, while the second section consists of two questions regarding the equipment and online platforms used by university instructors to perform their work. The third section includes seventeen 5-level scale items related to the difficulties from the use of ICT for teaching. The fourth section contains six questions about the attitudes of university instructors for the use of ICT during the lockdown and the post-Covid period on a 3-level scale.

A face validity check of the scale of difficulties was performed twice by 3 independent critical reviewers, before the first (pilot) use of the questionnaire to 25 individuals. After the pilot use, some specific necessary reviews were made according to the results of the preliminary Cronbach's alpha test. After the second pilot use to 30 other individuals, the questionnaire was electronically distributed through an email sent to the members of the academic staff of Greek universities.

2.4. Data analysis

Both parametric and non-parametric tests (Mann-Whitney, ANOVA, Kruskal-Wallis) were used for investigating the impact of demographics and general characteristics to the expressed difficulties instructors faced. Factor Analysis was then applied to the difficulties variables, and each factor was further analyzed on demographics and general characteristics, with the use of non-parametric tests (Mann-Whitney and Kruskal-Wallis). Spearman correlation analyses were finally employed to investigate the relationship between factors of difficulties and the attitudes of instructors.

2.5. Moral and ethical issues

The authors took several measures to ensure sensitive issues of the participants. Initially, the email sent included a text, which explained the purpose of the study, the exclusive research interest of the co-authors, the observance of anonymity, and included full contact information for a member of the research team. A relevant question was provided for the consent of the participants. No data indicating personal information, such as the participant's email, was kept in the electronic log of responses.

3. Analysis of demographics and technology used

3.1. Participants in the survey

1183 people belonging to teaching staff from all the HEIs in Greece, took part in the survey. Figure 1 shows the number of participants per university.

Table 1 displays the demographics and general characteristics of the participants, 61.8% of whom are males and 38.2% females, which reflects approximately the gender percentages in the entire population of the teaching staff.[2] In total, 69.1% of the sample belongs to the three levels of faculty members – Teaching and Research Staff (or DEP in Greek[3]). It is noted that the Lecturer level no longer exists among faculty members (DEP), although there are still people working at that level. An analysis between gender and status showed that males were mostly Full Professors, Associate Professors and Assistant Professors with 257, 151 and 141 people respectively, while females were mostly Laboratory Teaching Staff, 1st- and 3rd-level Professors (Full and Assistant Professors) with 109, 99 and 87 people, respectively.

Regarding participants' age, 1162 people answered the open-ended question. Ages follow the normal distribution curve with almost coinciding mean and median values (mean age = 52.69 years, median age = 52 years) and standard deviation equal to 7.8 years (prevailing age is 50 years old). The mean/median age indicates that half of the participants in the survey are mostly in their *second adult life*. The minimum age is 28 years, and the maximum age is 75 years (one person). For the maximum age it is worth mentioning that the legal retirement age is 67 years, however everyone is welcome to continue their research work at the university.

[1] Hellenic Statistical Authority: https://www.statistics.gr/en/statistics/-/publication/SED33/-.

[2] The percent of 61.8% of males in the sample is close to the population percent of 64.9%, since the males are 8272 in a total of 12,744 people, according to the most recent data of 2018 of the Hellenic Statistical Authority. *Source*: https://www.statistics.gr/en/statistics/-/publication/SED33/-).

[3] The percent of 69.1% is close to the population percent of DEP members, who are equal with 8475 people in a total teaching staff of 12,744, or 66.5%, according to the Hellenic Statistical Authority data of 2018. *Source:* https://www.statistics.gr/en/statistics/-/publication/SED33/-).

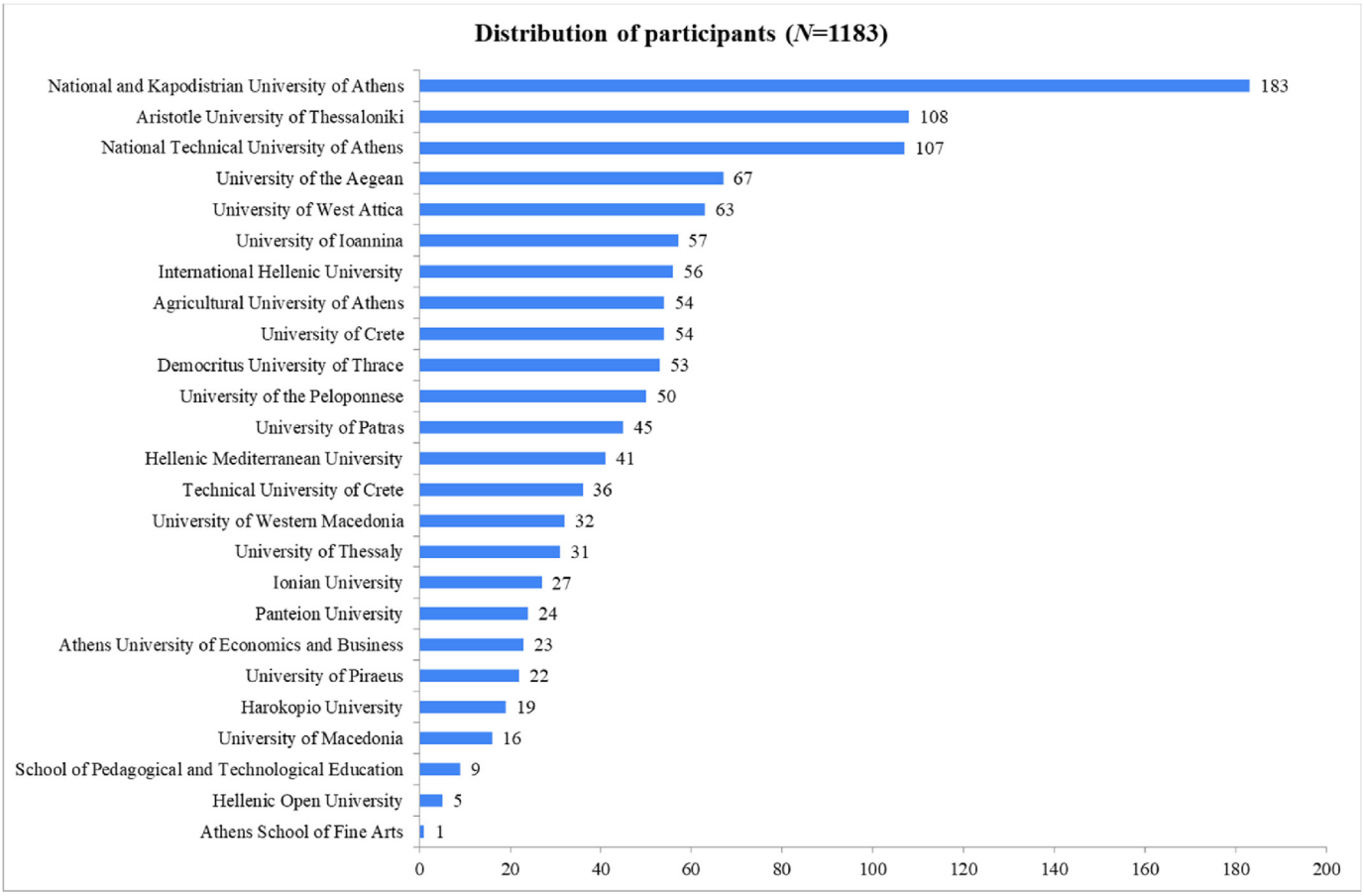

Figure 1. Participants per institution.

3.2. *Hardware and software use in HEIs – 1st research question*

The first research question concerns the technological equipment and electronic means used during the lockdowns. The survey findings show that university instructors used a combination of fixed and portable equipment, as well as remote teaching/teleconferencing platforms and web-based applications to meet their obligations during the lockdown. It is noted that both questions above are multiple-choice in the questionnaire, thus giving participants the chance to choose any type of equipment and/or platforms/applications. A literature review for the technology use in education during pandemic, is presented in the article of Sukendro et al. (2020).

In particular, as shown in Table 2, 100% of the instructors had the necessary technological equipment either at home and/or at the office.

Table 1. Descriptive statistics of Sample.

Question	*Categories*	*N*	%
Gender	Male	731	61.8
	Female	452	38.2
Categories of teaching staff	Full Professor (faculty member)	356	30.1
	Associate Professor (faculty member)	233	19.7
	Assistant Professor (faculty member)	228	19.3
	Laboratory Teaching Staff (EDIP)	214	18.1
	Contractual teacher	55	4.6
	Special Technical Laboratory Staff (ETEP)	44	3.7
	Lecturer	29	2.5
	Special Education Staff (EEP)	24	2
Years of work in higher education	20 years or more	539	46
	11–20 years	432	37
	6–10 years	100	8
	Up to 5 years	112	9

Table 2. Use of equipment and platforms/web-based applications during the lockdown.

Question	Categories	N	%
Equipment	Home laptop	851	72
	Work desktop	438	37
	Home desktop	417	35
	Work laptop	416	35
	Home tablet	118	10
	Work tablet	33	3
	Mobile phone	33	3
Platforms/Applications	Institution's Web Mail	952	80
	Zoom©	764	65
	Teams©	563	48
	Webex©	460	39
	Skype©	355	30
	Personal Email (e.g., Gmail©)	336	28
	Skype for Business©	308	26
	E-Class©	84	7
	Google Meet©	58	5
	Big Blue Button (BBB) ©	50	4
	Other	39	3
	Moodle©	26	2

The minimum number of equipment used is 1, the maximum is 7 (out of 7 choices), mean = 2 and SD = 1.

In total, the Platforms/Applications used are in average 3.4 per person, SD = 1.5, min = 1, max = 8, which indicates a combination of various software tools utilized during the lockdown. Regarding the software used to support remote teaching obligations, the institution's webmail is ranked first (80%, N = 952), which exclusively or in combination with the personal webmail (28%, N = 336) helped with the communication. It is worth mentioning that Greek universities are technologically autonomous, permanently connected to the Greek Research and Technology Network or GRNET (www.grnet.gr) with a speed of 10 Gbps.

During the lockdown, Greek universities granted university instructors with user licenses to the most up-to-date teleconferencing platforms for creating online classrooms that hosted the educational processes, facilitated the supervision of e-exams, and provided a collaborative environment. Zoom was the mostly used one, followed by Teams and Webex. However, if we consider the *classic* Skype, along with Skype for Business, those two interfaces were also used by more than half of the participants. Google Meet is not adopted in Greece in the extend it is used in other universities, like the British University in Dubai (Saeed Al-Maroof et al., 2020). Nevertheless, the degree of each platform use differs among the Greek universities, as it is shown for some indicative universities in Table 3.

It is worth noting that all participants in the survey claimed that they had access to a teleconferencing/remote teaching platform, which demonstrates the universities' resilience to addressing the technological needs created by the crisis, as it is mentioned by Papaioannou (2021).

Most Greek HEIs provided some sort of support, mainly technical support (guidelines were uploaded in the web pages, helpdesk email account was activated and at least one telephone number was available to the academic community). Universities adjusted their policies for e-exams and recognized the risks of lower engagement or achievement among students with mental health challenges, as Chirikov et al. (2020) mention.

It should be stressed here that, before the pandemic, Greek universities had the E-Class asynchronous remote teaching platform to share educational materials with students, exchange messages, etc. E-Class is an integrated Asynchronous Class Management System based on the philosophy of open-source software. It is actively supported by the GUnet Academic Network (https://www.gunet.gr/el/) in Greece and is freely distributed in universities and secondary schools. During the pandemic, the platform was upgraded and successfully supported online exams either through (a) the *Exercises* link, with the possibility to create multiple-choice tests/exercises, fill-in-the-blanks, right/wrong, etc. questions of various categories of difficulty or randomly displayed in students, or (b) through the *Tasks* link with time limit for student to upload their answers. In the latter case, answers were scanned during the exam, either by a home scanner or by students' mobile phones (using free software applications like CamScanner). However, although E-Class is a key tool for every university instructor, it appears that it was not largely mentioned in this survey as a tool that supported the remote educational process during the lockdown. A possible reason is that participants may have linked the question about the use of platforms/software with the ones they did not use prior to the lockdown, when there was no need to create online classrooms. This justifies the extremely high use of the institution's web-based email and various teleconferencing platforms as opposed to the use of E-class, which existed before the pandemic and was not largely chosen by the participants.

It is worth mentioning, that in addition to the aforementioned services included in the survey, during the lockdown national universities also activated (if they had not already done so before the pandemic) a number of other online services, such as Virtual Private Network (VPN) service that enables users connected to the internet through alternative providers (e.g. at home), to have secure access to the core network of each institution, ensuring access to services for which each institution is licensed. Similarly, other online services activated were (a) the remote use of the electronic accounts of students/academic-administrative staff in Computer Centers, laboratories and the remote use of academic/management software, etc. through the service of Virtual Desktop Infrastructure – VDI connector©, (b) file sharing (equivalent to Google-Drive©), (c) cloud object storage, (d) web hosting, (e) bulk text messaging, (f) web-based systems for posting announcements/events or entering grades or course registrations, (g) online services for administrative/technical issues, such as digital signature that helped a lot during the pandemic, etc.

Forced by the pandemic, universities rather easily transitioned to an integrated high digitally enabled remote teaching ecosystem, a capability they did not have to such an extent before the pandemic. This is linked to the pre-existing digital skills of the members (students/instructors/employees) as well as the pre-existing technological infrastructure and experience, which formed the basis of further adaptations to respond to the crisis. However, the prolonged use of technology also created difficulties and had some consequences for university instructors regarding teaching, as presented in the next section.

Table 3. The most used platforms per University (in bold, the most used).

	Zoom	Teams	Webex	Skype/Skype for Business
National and Kapodistrian University of Athens	129 (70%)	30 (16%)	**165 (90%)**	103 (56%)
Aristotle University of Thessaloniki	**102 (94%)**	25 (23%)	11 (10%)	82 (76%)
National Technical University of Athens	38 (36%)	64 (60%)	**93 (87%)**	42 (39%)
University of Aegean	**62 (93%)**	14 (21%)	18 (27%)	35 (52%)
University of West Attica	17 (27%)	**62 (98%)**	8 (13%)	21 (33%)

3.3. Attitudes towards the use of ICT – 2nd research question

The 2nd research question concerns the attitudes of instructors on a series of issues in relation to the use of technological means during the pandemic. The attitudes towards the use of ICT correspond to the 4th part of the questionnaire, where a 3-level scale is used. As it is presented in Table 4, most instructors (50.2%) claim that their performance was not affected due to remote teaching (A1), neither positive nor negative (mean = 1.998, SD = 0.706). The more detailed results (see the Appendix) in relation to gender show a higher percentage of women compared to men to agree with the specific option (52.2%), similarly in relation to the staff category, Contractual teachers show a higher agreement (68.9%), followed by ETEP (60%) and Assistant Professors (52.8), while in relation to the years of work, those who work up to 10 years show a higher agreement.

Nevertheless, it seems in A2, university teaching staff formed a friendly opinion about a potential future combination of technological tools along with in-person teaching in a new hybrid mix system (mean = 1.669, SD = 0.645), as the 47.4% agrees with this option. More detailed results show (Appendix), a stronger agreement of men (48.3%), of contractual teachers (53.7%), EEP (52.2%) and Full Professors (50.3%), as well as of those of 6–10 years of work (53.5%). This constitutes a novel finding, because it was something inconceivable before the lockdown, since all undergraduate courses (and most post-graduate) were taught in-person. Nevertheless, there is also a relatively high percentage disagreeing with the perspective of continuing the courses remotely in the post-Covid period (42.8%).

Regarding the future use of ICT for the organization of distance exams (A3), it seems that in the post-Covid era a very high percentage (61.8%) disagrees with such an option. Women show higher agreement on the

Table 4. Attitudes towards the use of ICT (during the lockdown and the post-Covid period).

A1.To what extent the remote teaching affected your performance? (*mean = 1.998, SD = 0.706*)	My performance was affected negatively	25%
	My performance was affected neither positively nor negatively	50.2%
	My performance was affected positively	24.8%
A2.Would you like your courses/ workshops being accomplished remotely in the future? (*mean = 1.669, SD = 0.645*)	No, I would not like	42.8%
	Mix system, in-person and remotely	47.4%
	Yes, I would like	9.7%
A3.Would you like to organize remotely the examinations in the future? (*mean = 1.488, SD = 0.679*)	No, I would not like	61.8%
	Mix system, in-person and remotely	27.7%
	Yes, I would like	10.5%
A4. Have you changed the way you teach your course/workshop? (*mean = 2.36, SD = 0.856*)	No, I have not changed	25%
	Lecturing techniques is always applied	14%
	Yes, I have changed	61%
A5.Did you adapt the educational material due to remote teaching? (*mean = 2.728, SD = 0.572*)	No, I did not adapt it	6.5%
	The educational material was appropriate designed both for in-person and remote teaching	14.3%
	Yes, I have adapted it	79.2%
A6. Have you changed the way you support students during lockdown? (*mean = 2.626, SD = 0.719*)	No, I have not changed the way	14.1%
	The way is the same regardless of the teaching style (in-person or remotely)	9.1%
	Yes, I have changed the way	76.8%

specific choice with 66.3%, as well as Lecturers (69%) and those of 6–20 years in higher education (see Appendix).

In A4, a large percentage said they had changed their prevailing pre-pandemic teaching technique (61%), with a mean value equal with 2.36 and standard deviation equal with 0.856. Women displayed a higher percentage (65.8%), as well as Lecturers (79.3%), ETEP (74.4%), EEP (75%) and EDIP (68.1%) did.

Similarly, the percentage that adapted the educational material during remote teaching – A5 (79.2%) is the highest across the six attitudes (mean = 2.728, SD = 0.572). Females (84.7%) display a higher agreement with this attitude, along with EEP (91.7%), Lecturers (89.7%), ETEP (83.3%), Associate Professors (81.9%), and EDIP (81.7%).

Very high (76.8%) is also the percentage that has changed the way students are supported during lockdown (A6), with a mean value of 2.626 and standard deviation equal to 0.719. Again, females display higher percentages (78.9%), along with Lecturers (89.7%), EEP (82.6%), EDIP (82%), and Assistant Professors (78.2%), as well as those with 11–20 years in higher education (78.1%).

4. Difficulties for university instructors

4.1. Basic analysis – 3rd research question

The questionnaire included 17 items, on a numerical 5-point scale from 1 to 5 (1: no difficulty - 5: major difficulty).

These difficulties, as shown in Table 5, focus on the teaching effort. There are more categories which were affected and are related with research activities and those related with well-being during remote online teaching, which are not included in the current survey. Thus, a subset of difficulties is analyzed in depth herein.

It appears that the following items presented a major challenge:

- 9. Limited interaction with my students (Mean = 4)
- 8. I could not meet my students in person (Mean = 3.99)

Table 5. Statistical measures for difficulties (mean, standard deviation).

Difficulties	Mean	SD
1. My internet connection at home was unstable	2.11	1.121
2. I was using inadequate/old equipment	1.81	1.040
3. Low sound and image quality of the platform I was using	1.86	0.947
4. I am insufficiently familiar with technology	1.53	0.810
5. It was difficult to set up/connect the required software (teleconferencing platforms, etc.)	1.48	0.801
6. Online teaching always made me nervous (e.g., due to connection failures)	2.08	1.088
7. Distance examinations made me more nervous (e.g., due to connection failures)	2.54	1.308
8. I could not meet my students in person	3.99	1.114
9. Limited interaction with my students	4.00	1.126
10. Lack of in-person collaboration with my colleagues	2.98	1.327
11. Change of educational process (teaching and examinations)	3.37	1.241
12. It was difficult to find a merit-based method for my students' final examinations through electronic media	3.67	1.319
13. It was difficult to find a reliable system to supervise my students through electronic media	3.83	1.336
14. I had to often repeat myself because my students were distracted	2.66	1.228
15. I could not use a blackboard	2.57	1.426
16. Time spent to find extra support material for the class	3.04	1.330
17. Time spent to organize the distance examinations	3.38	1.285
Total	2.76	0.696

- 13. It was difficult to find a reliable system to supervise my students (during examinations) through electronic media (Mean = 3.83), which is also mentioned as an obstacle in Munoz and Mackay (2019).

Respectively, the following items created minor difficulties:

- 5. It was difficult to set up/connect the required software (teleconferencing platforms, etc.) (Mean = 1.48)
- 4. I am insufficiently familiar with technology (Mean = 1.53)
- 2. I was using inadequate/old equipment (Mean = 1.81).

It follows from the above that to respond to the transition from in-person to remote teaching, university instructors encountered less difficulties related to the set up/connection of the required software (because they were familiar with it), as well as with the available equipment (which was adequate, and they knew how to use it). On the contrary, the major difficulty was the instructors' limited interaction with their

Table 6. Ranks & Test Statistics (Grouping variable: Gender).

	Gender	N	Mean Rank	Sum of Ranks
Average of 17 items	Man	731	539.08	394068.00
	Woman	452	677.58	306268.00
	Total	1183		
Mann-Whitney U	126522.000			
Asymp. Sig. (2-tailed)	.000			

Table 7. Category of staff multiple comparisons.

Average of 17 items Bonferroni						
(I) Category	(J) Category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Full Professor	Associate Professor	-.14640	.05837	.344	-.3291	.0363
	Assistant Professor	-.14818	.05875	.330	-.3321	.0358
	Lecturer	-.31662	.13376	.506	-.7354	.1022
	EDIP	-.17808	.05991	.084	-.3657	.0095
	EEP	-.31755	.14608	.838	-.7749	.1398
	ETEP	-.22553	.11069	1.000	-.5721	.1210
	Contractual teacher	-.05655	.10035	1.000	-.3707	.2576

students whom they could not meet in person, as well as the supervision during an electronic examination.

To test the effect of demographic/general characteristics on the expressed difficulties, a new variable was created which includes the average of the 17 items. The individual variables take values from 1 to 5, and an increase in the average implies an increase in the difficulties of the teachers. In addition, their reliability was checked through Cronbach's Alpha, with a value of 0.883 for 17 items, showing the high reliability of the new variable. Based on the results of Normality Tests Parametric and non-parametric tests were also conducted.

As Table 6 displays, the mean rank for men is 539.08, whereas for women is higher (677.58) and there is a significant difference between the two genders regarding the difficulties faced (Asymp. Sig. = 0.000 < 0.05).

Using ANOVA and the post-hoc Bonferroni method of multiple comparisons, no statistically significant differences were found concerning Category of staff (Table 7).

Similarly, no statistically significant differences were found concerning Years of work in higher education (Asymp. Sig. = 0.941 > 0.05), and Age[4] (Asymp. Sig. = 0.769 > 0.05), as shown in Table 8.

4.2. Factor Analysis

Based on the 17 items, an Exploratory Factor Analysis was performed. The Kayser-Meyer-Olkin (KMO) index was equal to 0.861, indicating that the data are suitable for FA. Five factors arise as shown in Table 9, where the largest factor loadings are marked in bold.

In particular, the first factor has 5 items/difficulties for university instructors with a very good internal consistency Cronbach alpha index = 0.834[5], as follows:

- 8. I could not meet my students in person.
- 9. Limited interaction with my students.
- 10. Lack of in-person collaboration with my colleagues.
- 11. Change of educational process (teaching and examinations).
- 14. I had to often repeat myself because my students were distracted.

The second factor has 5 items/difficulties with an acceptable internal consistency Cronbach alpha index = 0.777, as follows:

[4] We grouped respondents into 4 almost-equal age groups: 28–48 (N=342, 29%), 49–52 (N=261, 22.2%), 53–59 (N = 313, 26.6%), 60–75 (N = 262, 22.2%). Total (N = 1178, 100%).

[5] The internal reliability of the constructs' items was estimated through the Cronbach's alpha. In the opinion of Nunnally and Bernstein (1978), a reliability coefficient of 0.70 or greater is thought to be acceptable.

Table 8. Kruskal Wallis - Test Statistics[a] (Years of work in HE & Age).

	Average of 17 items (Grouping Variable: Years of work in HE)	Average of 17 items (Grouping Variable: Age)
Chi-square	.398	1.134
df	3	3
Asymp. Sig.	.941	.769

[a] Kruskal Wallis Test.

Table 9. Rotated component matrix.[a]

Difficulties	1	2	3	4	5
1. My internet connection at home was unstable.	0.095	**0.773**	0.024	0.071	-0.019
2. I was using inadequate/old equipment.	0.079	**0.681**	0.062	0.147	0.206
3. Low sound and image quality of the platform I was using.	0.125	**0.729**	0.005	0.112	0.047
4. I am insufficiently familiar with technology.	0.056	0.117	0.050	0.099	**0.860**
5. It was difficult to set up/connect the required software (teleconferencing platforms, etc.).	0.050	0.152	0.043	0.090	**0.845**
6. Online teaching always made me nervous (e.g., due to connection failures).	0.259	**0.590**	0.122	0.164	0.425
7. Distance examinations made me more nervous (e.g., due to connection failures).	0.236	**0.491**	0.370	0.184	0.343
8. I could not meet my students in person.	**0.842**	0.112	0.146	0.090	0.021
9. Limited interaction with my students.	**0.839**	0.110	0.218	0.106	0.045
10. Lack of in-person collaboration with my colleagues.	**0.713**	0.176	0.043	0.159	0.084
11. Change of educational process (teaching and examinations).	**0.610**	0.134	0.411	0.251	0.167
12. It was difficult to find a merit-based method for my students' final examinations through electronic media.	0.273	0.080	**0.864**	0.177	0.059
13. It was difficult to find a reliable system to supervise my students through electronic media.	0.190	0.034	**0.897**	0.150	0.042
14. I had to often repeat myself because my students were distracted.	**0.474**	0.214	0.198	0.445	-0.010
15. I could not use a blackboard	0.363	0.035	0.086	**0.588**	0.189
16. Time spent to find extra support material for the class.	0.126	0.205	0.043	**0.851**	0.106
17. Time spent to organize the distance examinations.	0.088	0.192	0.342	**0.737**	0.056

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
[a] Rotation converged in 6 iterations.

- 1. My internet connection at home was unstable.
- 2. I was using inadequate/old equipment.
- 3. Low sound and image quality of the platform I was using.
- 6. Online teaching always made me nervous (e.g., due to connection failures).
- 7. Distance examinations made me more nervous (e.g., due to connection failures).

The third factor has 2 items/difficulties with a very good internal consistency Cronbach alpha index = 0.887, as follows:

- 12. It was difficult to find a merit-based method for my students' final examinations through electronic media.
- 13. It was difficult to find a reliable system to supervise my students through electronic media.

The fourth factor has 3 items/difficulties with an acceptable internal consistency Cronbach alpha index = 0.716, as follows:

- 15. I could not use a blackboard.
- 16. Time spent to find extra support material for the class.
- 17. Time spent to organize the distance examinations.

Finally, the fifth factor has 2 items/difficulties with an acceptable internal consistency Cronbach alpha index = 0.753, as follows:

- 4. I am insufficiently familiar with technology.
- 5. It was difficult to set up/connect the required software (teleconferencing platforms, etc.).

According to Yong and Pearce (2013, p.80) a factor with two variables (third and fifth factor in our case) is only considered reliable when the variables are highly correlated with each other ($r > 0.70$) but fairly uncorrelated with other variables. This condition holds for items 12 and 13 (third factor) with a correlation index 0.796, but doesn't hold for variables 4 and 5 (fifth factor) which are medium correlated (0.603). However, we consider we could retain the factor since it interprets *personal difficulties with technology* according to our empirical criteria, and thus it has a clear meaning (Worthington and Whittaker, 2006).

Therefore, the difficulties encountered by university instructors during the pandemic could be grouped as follows:

- 1st factor: *difficulties in teaching & collaboration.*
- 2nd factor: *difficulties due to dependence on technology.*
- 3rd factor: *dilemmas about the examinations.*
- 4th factor: *difficulties in organizing classes/examinations.*
- 5th factor: *personal difficulties related with technology.*

More specifically, as indicated in Table 10, the variance percentage explained by the 1st factor is 35.314% and by the 2nd factor is 11.569%, that is the two factors together explain 46.883%. Hence, the most important difficulty factors relate to the usual academic practice, *teaching and collaboration* (1st factor), as well as the uncertainty resulting from *dependence on technology* (2nd factor). The 5th factor expresses the least important difficulty, namely *personal difficulties with technology* that may result from limited experience/familiarization and/or limited knowledge of/skills in electronic media.

In conclusion, the application of the Exploratory Factor Analysis highlighted 5 factors/difficulties for instructors, as the aggregate results are shown in Table 11.

4.3. Group Comparison Tests – 4th & 5th research hypotheses

The investigation of the fourth and fifth research questions follows, where the non-parametric Mann-Whitney and Kruskall-Wallis tests were used, as well as Spearman rho correlation. To apply the tests, five new variables were created (subscale for 1st factor: SF1 to subscale for 5th factor: SF5), which represent the average of the items belonging to each factor, according to the results of the previous FA. SF1 variable for instance, includes the answers to the five questions 8, 9, 10, 11 and 14 that are grouped in the first factor, and the same holds for the other variables. These variables take values from 1 to 5 and the increase of the average implies the increase of the difficulties of the instructors.

Furthermore, the groups of difficulties were tested through Cronbach's Alpha, with their values ranging from 0.887 to 0.716 (see Table 11), indicating high reliability for the new variables.

Next, the Kolmogorov-Smirnov tests were performed for the distributions of the values of each new variable (SF1–SF5). As can be seen in Table 12, the subscales do not follow a normal distribution (Sig. < 0.001), and hence non-parametric statistical tests were applied.

The Mann-Whitney U test was used to compare whether there is a difference in the dependent variable (SF1–SF5) for two independent groups of gender. For the variable SF1 (*average difficulties in teaching & collaboration*) the median value for women [$(Mdn_{wF1}) = 3.6$] is higher than that for men ($Mdn_{mF1} = 3.4$). The Mann-Whitney Test indicated that this difference is statistically significant, with $U(N_w = 452, N_m = 731) =$

Table 10. Total variance explained.

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.003	35.314	35.314	6.003	35.314	35.314	2.943	17.314	17.314
2	1.967	11.569	46.883	1.967	11.569	46.883	2.426	14.268	31.582
3	1.289	7.581	54.463	1.289	7.581	54.463	2.117	12.453	44.035
4	1.169	6.878	61.341	1.169	6.878	61.341	2.092	12.304	56.339
5	1.040	6.116	67.457	1.040	6.116	67.457	1.890	11.118	67.457
6	.777	4.571	72.028						
7	.678	3.988	76.016						
8	.617	3.628	79.644						
9	.563	3.312	82.956						
10	.554	3.261	86.217						
11	.523	3.075	89.292						
12	.415	2.441	91.732						
13	.398	2.340	94.073						
14	.331	1.950	96.022						
15	.253	1.490	97.513						
16	.231	1.359	98.872						
17	.192	1.128	100.000						

Extraction Method: Principal Component Analysis.

Table 11. Factor Analysis aggregate results.

Factor	Variable	Factor loading	Communality	Cronbach alpha
Difficulties in teaching & collaboration	8. I could not meet my students in person.	0.842	0.751	0.834
	9. Limited interaction with my students.	0.839	0.778	
	10. Lack of in-person collaboration with my colleagues.	0.713	0.573	
	11. Change of educational process (teaching and examinations).	0.610	0.651	
	14. I had to often repeat myself because my students were distracted.	0.474	0.507	
Difficulties due to dependence on technology	1. My internet connection at home was unstable.	0.773	0.613	0.777
	2. I was using inadequate/old equipment.	0.681	0.537	
	3. Low sound and image quality of the platform I was using.	0.729	0.562	
	6. Online teaching always made me nervous (e.g., due to connection failures).	0.590	0.637	
	7. Distance examinations made me more nervous (e.g., due to connection failures).	0.491	0.585	
Dilemmas about the examinations	12. It was difficult to find a merit-based method for my students' final examinations through electronic media.	0.864	0.863	0.887
	13. It was difficult to find a reliable system to supervise my students through electronic media.	0.897	0.866	
Difficulties in organizing classes/ examinations	15. I could not use a blackboard.	0.588	0.522	0.716
	16. Time spent to find extra support material for the class.	0.851	0.795	
	17. Time spent to organize the distance examinations.	0.737	0.709	
Personal difficulties with technology	4. I am insufficiently familiar with technology.	0.860	0.769	0.753
	5. It was difficult to set up/connect the required software (teleconferencing platforms, etc.).	0.845	0.749	

142654.5, z = −3.958, p < .001. The same holds for the SF2 "*average difficulties due to dependence on technology*" (Mdn_{wF2} = 2.2, Mdn_{mF2} = 1.8), the SF4 "*average difficulties in organizing classes/examinations*" (Mdn_{wF4} = 3.33, Mdn_{mF4} = 3) and the SF5 "*average personal difficulties with technology*" (Mdn_{wF5} = 1.5, Mdn_{mF5} = 1), where the differences between women and men are statistically significant (for SF2: U(N_w = 452, N_m = 731) = 121131.5, z = −7.746, p < .001, for SF4: U(N_w = 452, N_m = 731) = 136470.5, z = −5.053, p < .001, for SF5: U(N_w = 452, N_m = 731) = 123177.5, z = -8.087, p < .001).

Table 12. Tests of normality.

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
SF1	.087	1183	.000	.972	1183	.000
SF2	.114	1183	.000	.944	1183	.000
SF3	.175	1183	.000	.863	1183	.000
SF4	.091	1183	.000	.969	1183	.000
SF5	.303	1183	.000	.728	1183	.000

Table 13. Test statistics (Asymp. Sig.).[a]

	SF1	SF2	SF3	SF4	SF5
Categories of Teaching Staff	0.252	**0.000**	0.342	**0.018**	**0.017**
Years of work in Higher Education	0.902	0.194	0.964	0.271	**0.001**
University	**0.036**	0.628	**0.002**	0.241	**0.001**
Age	0.699	0.358	0.274	0.456	**0.000**

[a] Kruskal Wallis Test.

Kruskal Wallis Test (Table 13) indicated that regarding the *Category of teaching staff* a statistically significant difference exists in relation to SF2 "*average difficulties due to dependence on technology*". Based on the mean ranks, the greatest difficulties arise in EEPs (mean rank = 763.46), ETEPs (mean rank = 733.42), and EDIPs (mean rank = 667.81), while Full Professors exhibited the smallest difficulties (mean rank = 505.1). Similarly, for the Category of teaching staff, statistically significant differences arise in relation to SF4 "*average difficulties in organizing classes/ examinations*", with the highest difficulties faced by Lecturers (mean rank = 793.71) and EDIPs (mean rank = 633.92) while the lowest are encountered by Contractual Teachers (mean rank = 553.65).

In particular, the difficulties for the EDIPs who had to respond to the practical part of courses that include laboratory practice of the students (teaching the laboratory part and examination), are in accordance with the report of the International Association of Universities (Marinoni et al., 2020). For the SF5 "*average personal difficulties with technology*" the highest difficulties were faced by Lectures (mean rank = 699.21), EEP (mean rank = 684.31), and Full Professors (mean rank = 600.28), while the lowest values were exhibited by Contractual Teachers (mean rank = 456.30).

In the respective Kruskal-Wallis Test for Years of work in Higher Education statistically significant differences were found regarding SF5 (*average personal difficulties with technology*). In this factor, *personal difficulties with technology* increase with the *Years of work*, as follows: those who have been working for more than 20 years have faced the greatest personal difficulties with technology (mean rank = 632.46), followed by those who have been working for 11–20 years (mean rank = 559.04), and those working from 6 to 10 years (mean rank = 554.39). For young people with work experience up to 5 years in Higher Education mean rank is 557.99.

The University Institutions variable (25 universities in the country) was then checked, and statistically significant differences were found regarding variables SF1, SF3, and SF5. In particular, for SF1, which is the most important factor, the highest difficulty was faced by the instructors from Panteion University (mean rank = 735.50), followed by the University of Thessaly (mean rank = 683.03), University of Patras (mean rank = 677.96), University of Ioannina (mean rank = 668.15) and the Harokopio University (mean rank = 651.53). On the other hand, the lowest level of difficulties was expressed by instructors of universities for Economics and Business studies, such as the Piraeus University (mean

rank = 452.75), the Athens University of Economics and Business (mean rank = 426.98) and the Macedonian University (mean rank = 417.47). Concerning SF3, the staff with the higher expressed average difficulties came from the University of Crete (mean rank = 697.36), University of Thessaly (mean rank = 678.68), National Technical University of Athens (mean rank = 664.05) and the Technical University of Crete (mean rank = 659.14). On the contrary, the fewer dilemmas for the examinations are expressed by the instructors of the School of Pedagogical and Technological Education (ASPAITE) with a mean rank = 482, the Ionian University (mean rank = 389.67), and the Athens School of Fine Arts (mean rank = 326). Finally, for the SF5 the higher difficulties are expressed by instructors of the universities: School of Fine Arts (mean rank = 1155.5), Democritus University of Thrace (mean rank = 693.65), Panteion University (mean rank = 681.90) and the Aristotle University of Thessaloniki (mean rank = 648.82), while the lowest personal difficulties with technology are expressed in the following HEIs: University of the Aegean (mean rank = 499.46), Technical University of Crete (mean rank = 492.92), and the Macedonian University (mean rank = 407.97).

Likewise, testing the Age variable showed statistically significant difficulties with SF5. People aged 60–75 had the highest personal difficulties with technology (mean rank = 679.91), followed by 53–59 (mean rank = 620.93), 49–52 (mean rank = 562.33) and 28–48 (mean rank = 512.21). A similar result about age is presented in Keržič et al. (2021), where authors concluded that age is not a factor in instructional ICT use (also the least important factor according to our FA results), although some differences appear in teachers' personal ICT uses.

A Spearman correlation test was performed for the 5th research question. Table 14 displays the p-values of the correlation coefficients, through which statistically significant differences emerged between the attitudes of the university instructors (A1–A6) and the subscales SF1 to SF5.

In particular, the lowest the extend teaching performance was affected (A1) the lowest the difficulties encountered in teaching and collaboration (SF1). The same applies to A2 and A3. In addition, more difficulties in teaching and collaboration faced the instructors who changed the way of teaching (A4), as well as those who adapted the educational material (A5), and those who changed the way they support their students (A6). The reported correlations are of small to moderate intensity, ranging from 0.157 to 0.470, in absolute value, being statistically significant at the 99% confidence level.

Similar results arise for the SF2. More difficulties *due to dependence on technology* encountered the instructors who changed the way of teaching (A4), as well as those who adapted the educational material (A5), and those who changed the way they support their students (A6). Here as well, the correlations (positive and negative) are of small to moderate intensity, being statistically significant at the 99% confidence level, while there is a higher correlation (−0.250) with A1 (extend of effect on teaching performance).

The *dilemmas about the examination* (SF3) are negatively correlated (−0.373) with A3 (*intention to organize remote examinations in the future*), as well as with A1 (*performance during remote teaching*, −0.286), and A2 (*remotely accomplished courses/workshops in the future*, −0.222). The correlations are of small to moderate intensity, being statistically significant at the 99% confidence level. The results are similar for SF4 (*difficulties in organizing classes/examinations*) and SF5 (*personal difficulties with technology*), while non-statistically significant correlation exists between SF5 and A6 (Sig. 0.721).

5. Discussion and conclusions

This paper explored the impact of the use of ICT during lockdown on University Instructors. Results show that, whereas the overall assessment of emergency remote teaching is positive, it seems that instructors have been challenged by the extreme use of technology. The age and years of experience, seem to have very low influence on the adoption of technology, although it is well-known that these two factors constitute major obstacles in regular circumstances (Alhawsawi and Jawhar, 2021).

Amid the lockdown, seven out of ten instructors used their personal laptops, while the institution's web-based email was largely used to cover communication needs. The teleconferencing platforms mostly used were Zoom, Skype/Skype for Business, Teams and, to a lesser extent, Webex, although the preference for platforms between universities seems to differ.

Most university instructors participating in the survey stated that

- Their performance was not affected due to the use of electronic media.
- The way they taught before the pandemic (lecturing) has changed during the emergency remote teaching.
- They adapted the educational material to the needs of remote teaching.
- They changed the way of support provided to their students during lockdown.
- They would like to follow a mix system of online and in-person teaching in the future.
- They do not want to organize distance exams in the post-Covid era.

Regarding the difficulties participants faced, these concern mainly the limited interaction with students, the inability to meet students in person, and the difficulty in finding a reliable system to supervise students through electronic media during e-exams. It seems that the reduced

Table 14. Correlations Spearman's rho.

		A1	A2	A3	A4	A5	A6
SF1	Correlation Coefficient	-.470**	-.428**	-.332**	.217**	.157**	.218**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
		A1	A2	A3	A4	A5	A6
SF2	Correlation Coefficient	-.250**	-.221**	-.200**	.186**	.122**	.126**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
		A1	A2	A3	A4	A5	A6
SF3	Correlation Coefficient	-.286**	-.222**	-.373**	.092**	.046	.170**
	Sig. (2-tailed)	.000	.000	.000	.002	.116	.000
		A1	A2	A3	A4	A5	A6
SF4	Correlation Coefficient	-.283**	-.251**	-.221**	.267**	.270**	.237**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000
		A1	A2	A3	A4	A5	A6
SF5	Correlation Coefficient	-.094**	-.121**	-.116**	.079**	.087**	.011
	Sig. (2-tailed)	.003	.000	.000	.007	.003	.721
	N	976	1160	1157	1174	1178	1140

interaction with students, and the effort to minimize the cheating threat during online testing burdened instructors psychologically, in accordance with the findings of Munoz and Mackay (2019). Overall, women seem to express a greater degree of difficulties than men.

The most important group of difficulties discovered by FA was *teaching and collaboration*, referring to the difficulties in fostering a constructive teaching and collaboration environment through online platforms. In particular, this group refers to the inability to meet students in person, the limited interaction with students, the lack of collaboration with colleagues, the change of educational process, and the fact that students are distracted during online classes. This finding is in line with the effective online educational environments as these are described by Pavlis-Korres et al. (2009), Sun and Chen (2016), Finch and Jacobs (2012), who support that immediacy, interaction and communication between instructor and students are necessary. Social interaction, even online, is highlighted by many researchers such as Kim et al. (2014). Therefore, the absence of a physical and emotional framework, the existence of which is a positive working condition for instructors and students, seems to negatively affect instructors in this new type of coexistence/educational practice through electronic media. Remote teaching and collaboration in Greece, had an impact on the psychosocial relationships between teachers and students, as well as between teachers themselves, and apparently on the relationships between students, which remains to be proven by another survey (by way of indication, see Wut and Xu, 2021).

The 2nd group of difficulties (*dependence on technology*) refers to the technological dependence of university instructors, which is affected by the quality of home internet connection, the equipment, the sound/image quality of the remote teaching platform, and the extra stress that such dependence may cause either for the smooth performance of online teaching and/or online examinations of students. Although instructors had the opportunity of working from the university premises instead from home, and even though national universities have excellent technological infrastructures, the intensive and constant dependence on technology appears to be another factor of psychological burden.

The 3rd group of difficulties (*dilemmas about the examinations*) relates to the instructors' dilemmas for finding a transparent/reliable and merit-based process for distance examinations, according to the applicable standards. This type of difficulties is discussed in the EU NESET report (2020, p. 27), since student assessment and academic integrity in the context of online learning is an area of concern but is yet under-researched.

Finally, the last two groups (*organizing classes/examinations*, and personal *shortcomings with technology*) include difficulties relating to organizational issues for e-classes/e-examinations, and the instructors' personal shortcomings when it comes to technology.

Therefore, the first three groups refer to difficulties with a *strong imprint on the psychology* of university instructors, while the last two groups refer to *actual* difficulties created by the mandatory use of remote education, which had a lesser effect.

Differences were found in the groups of difficulties in relation to the demographic/general characteristics, in the sense of the psychological/social ramifications of the consequences of the pandemic. In particular, women express a higher level of difficulties than men in almost all subgroups. Therefore, women experienced the consequences of the forced use of technology to a higher degree than men. Differences were also identified regarding the category of staff, where in relation to dependence on technology, staff who do not belong to the faculty express a higher level of difficulties. Similarly, difficulties are not equal among staff categories in the case of course/exam organization, and in the case of personal difficulties with technology.

Personal difficulties with technology differ by age group, and years of university work, with individuals who are older and/or have worked longer at the university reporting higher difficulties. Although, these difficulties are not a significant group, an important finding is that they differ with respect to all demographic/general characteristics that were controlled (gender, age, years of work, staff category, university institution).

In the most important group of *teaching and collaboration* difficulties, significant differences were observed among the university institutions. Similarly, in the second most important group, *dependence on technology*, significant differences were observed among staff categories, while in the third most important group, *dilemmas about examinations*, the perceived difficulties differ by institution.

Also, difficulties are slightly to moderately related to teachers' attitudes. In fact, changes in teaching methods, learning materials and student support have affected all groups difficulties.

To sum up, we would like to stress that Greek universities amid the lockdown proved their resilience and did not face any serious problems in supporting the educational and research project as far as technology is concerned. Moreover, university instructors responded immediately either by using their personal equipment, and/or their office equipment combined with the university online services.[6] However, university education – like any form/type/level of education – is a participatory process involving instructors and learners, where specifically instructors, according to the survey findings, have been and are still being challenged by their removal from the physical workplace (classroom), mainly on a psychological and less on an actual level.

That is, although all the instructors had the necessary technological means at a personal and/or institutional level, the difficulties expressed focus more on the psychological domain regarding their response to their complex – demanding and responsible role (Goodyear and Dimitriadis, 2013; Rapanta et al., 2020), where the entire educational process is the responsibility of the instructor, in contrast to other levels of education, where much of the responsibility rests with the state. Also, the organizational uncertainty caused by the removal from their physical workplace was another aggravating factor that they had to self-manage.

Results derived from this survey are closely related to the particular context at which instructors responded, which has been formed by contemporary technological capabilities offered by institutions, technical support (mainly) as well as the availability of software/equipment (personal or/and institutional).

Future research should take into consideration this context, which resembles at a high level to western and developed countries of the world. However, the size of sample (approximately 9% of the total university teachers), the age dispersion, the dispersion relating to gender, the dispersion relating to the answers given from all types of teaching staff, and the inclusion in the research of all institutions of the country give us the feeling that a similar research in another country under approximately the same/similar context could highlight the same or similar difficulties in relation to teaching.

In addition, future research should focus on more types of difficulties, issues related with research activities during the lockdowns, as well as personal difficulties. For example, what is the impact of Covid-19 in terms of accessibility to research infrastructures, sustainability of international research collaborations, ability to carry out fieldwork and participation in conferences. Also, in personal level what is the impact of the increased workload in conjunction with family obligations, physical isolation, fear for health, etc.

Declarations

Author contribution statement

Evangelia Krassadaki, PhD: Conceived and designed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

[6] For the transition of the educational process to online education in Georgia, Ukraine, Afghanistan and the Philippines, see Basilaia and Kvavadze (2020), Bakhov et al. (2021), Noori (2021) and Toquero (2020), respectively.

Stelios Tsafarakis, PhD: Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Vasilis Kapenis: Performed the experiments; Analyzed and interpreted the data.

Nikolaos Matsatsinis, PhD: Conceived and designed the experiments.

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Data availability statement

Data will be made available on request.

Declaration of interest's statement

The authors declare the following conflict of interests: Stelios Tsafarakis is associate editor in Heliyon's Business and Economics Section.

Additional information

No additional information is available for this paper.

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Appendix. Percentages for attitudes.

	A1			A2			A3		
	1	2	3	1	2	3	1	2	3
Gender									
Male	26.5	49	24.4	40.6	48.3	11.1	59	29.1	11.9
Female	22.4	52.2	25.4	46.4	46	7.6	66.3	25.4	8.3
Categories of teaching staff									
Full Professor	26.9	47.2	25.9	38.4	50.3	11.3	59	28.9	12.1
Associate Professor	27	48.1	24.9	44.2	45.9	9.9	59.6	29.6	10.9
Assistant Professor	24.9	52.8	22.3	43.9	45.7	10.3	64.9	25.7	9.5
Laboratory Teaching Staff (EDIP)	22	49,2	28.8	45.7	44.8	9.5	64.5	26.1	9.5
Contractual teacher	15.6	68.9	15.6	37	53.7	9.3	62.3	24.5	13.2
Special Tech. Lab. Staff (ETEP)	23.3	60	16.7	54.5	45.5	0	65.1	27.9	7
Lecturer	23.8	47.6	28.6	48.3	44.8	6.9	69	27.6	3.4
Special Education Staff (EEP)	30	45	25	43.5	52.2	4.3	56.5	30.4	13
Years of work in HE									
Up to 5 years	19.6	60.9	19.6	38.9	49.1	12	58.1	29.5	12.4
6–10 years	22.4	54.1	23.5	38.4	53.5	8.1	62.2	32.7	5.1
11–20 years	25.8	48.7	25.5	45	44.8	10.2	62.6	26.5	10.9
More than 20 years	26	48.4	25.6	42.7	48	9.2	61.8	27.3	10.9
Total	**25**	**50.2**	**24.8**	**42.8**	**47.4**	**9.7**	**61.8**	**27.7**	**10.5**

1, 2, 3 stands for the 3-level scale in each question.

	A4			A5			A6		
	1	2	3	1	2	3	1	2	3
Gender									
Male	26.4	15.6	58	8.7	15.5	75.8	15.8	8.7	75.5
Female	22.8	11.4	65.8	2.9	12.4	84.7	11.4	9.7	78.9
Categories of teaching staff									
Full Professor	25.4	16.3	58.3	8.2	16.6	75.2	14.8	11.9	73.3
Associate Professor	26.6	13.7	59.7	5.6	12.5	81.9	13.8	7.1	79
Assistant Professor	28	16.4	55.6	5.7	15.8	78.5	14.5	7.3	78.2
Laboratory Teaching Staff (EDIP)	23.9	8	68.1	4.7	13.6	81.7	10.2	7.8	82
Contractual teacher	28.8	19.2	51.9	10.9	16.4	72.7	26.4	11.3	62.3
Special Tech. Lab. Staff (ETEP)	11.6	14	74.4	2.4	14.3	83.3	14.6	19.5	65.9
Lecturer	10.3	10.3	79.3	10.3	0	89.7	6.9	3.4	89.7
Special Education Staff (EEP)	20.8	4.2	75	4.2	4.2	91.7	17.4	0	82.6
Years of work in HE									
Up to 5 years	22.2	17.6	60.2	6.3	13.4	80.4	16.7	7.4	75.9
6–10 years	23	18	59	5	18	77	17.5	8.2	74.2

(*continued on next column*)

(*continued*)

	A4			A5			A6		
	1	2	3	1	2	3	1	2	3
11–20 years	26.3	13.5	60.1	7.2	14.4	78.4	13.1	8.8	78.1
More than 20 years	25	12.8	62.2	6.2	13.8	80	13.8	9.9	76.3
Total	**25**	**14**	**61**	**6.5**	**14.3**	**79.2**	**14.1**	**9.1**	**76.8**

1, 2, 3 stands for the 3-level scale in each question

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