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This volume contains the edited proceedings of papers from the twenty sixth International Conference on Software Process Improvement Research, Education and Training, INSPIRE 2021 held remotely, organised by Solent University and the e-Learning Specialist Group of the BCS, The Chartered Institute for IT.

The objective of this conference is to promote international co-operation among those concerned with e-learning by creating a greater understanding of e-learning issues, and by sharing current research and case studies through academic and industrial experience.

The conference organisers feel that this objective has been achieved. INSPIRE 2021 has attracted papers from international sources, covering a broad spectrum of practical experience and research. The topic areas include the use of e-Learning and tools for schools, HE and the wider public, augmented reality, social media, programming in schools, gamification, cyber security in teaching and learning, case studies in use of e-learning in 2021 in various countries, including Armenia, Bangladesh, Bosnia-Herzegovina, China, Cyprus, Denmark, Egypt, Finland, Greece, Ireland, Kazakhstan, Kenya, Northern Ireland, Romania, Russian Federation, Spain, Turkey, UK, and the USA.

We would like to thank the many people who have brought this twenty sixth international conference into being: the Organising Committee, the International Advisory Committee, particularly for all their hard work in reviewing both the abstracts and the final papers, and the committee members of the BCS's e-Learning Specialist Group.

The organisers would like to thank the BCS and Solent University for their support.

The Editors

CONTENTS

Bihac, Bosnia-Herzegovina), Amela Colic (University of Bihac, Bosnia-Herzegovina), Bozana Tomic (Slobomir P University, Bosnia and Herzegovina), Andreas Savva (University of Nicosia, Cyprus), Vasso Stylianou (University of Nicosia, Cyprus), Saltanat Meiramova (Saken Seifullin Kazakh Agrotechnical University, Kazakhstan), Marwa Abd Elghany (Arab Academy for Science & Technology, Alexandria, Egypt), Nermine Khalifa (Arab Academy for Science & Technology, Alexandria, Egypt), Rita Gevorgyan (Armenian State Pedagogy University, Yerevan, Armenia), Daniela Popa (Transylvania University, Brasov Romania), Jackline Odero (Masinde Muliro University of Science and Technology, Kenya), Umulker Ali (Masinde Muliro University of Science and Technology, Kenya), Maria Panteri (Special Unified Vocational High School and Lyceum of Heraklion, Greece & Cordoba University, Cordoba, Spain), Karen Dennis (Illinois State University, Illinois, USA), Veronika Stoffova (Trnava University, Trnava, Slovak Republic), Dilara Begum (East West University, Dhaka, Bangladesh), Sunil Chaudhary (Norwegian University of Science and Technology, Norway), Maria Plastira (Aristotele University, Thessaloniki, Greece) Demet Soylu (Hacettepe University, Turkey), Margaret Ross (Solent University, UK), Geoff Staples (BCS, UK), Galina Zamaraeva (Vladimir University , Vladimir, Russia), Jury Panov (Vladimir University , Vladimir, Russia), Xu Zhang (Beijing Institute of Technology, China), George Portides (University of Nicosia, Cyprus), Claire McGuinness (University College, Dublin, Ireland), Theodora Valkanou (Copenhagen University, Denmark), Sandra Knezevic (University of Bihac, Bihac, Bosnia-Herzegovina) ***433***

Rapid migration from traditional or hybrid to fully virtual education in the age of the coronavirus pandemic: Challenges, Experiences and Views of College and University students

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Abstract

The abrupt outbreak of the coronavirus pandemic throughout the world in March 2020 resulted in the sudden closure of all schools, colleges and universities, institutions, and an unprecedented pivot to remote learning. Students and teachers were confronted with the overwhelming challenge of migrating from the traditional face-to-face or hybrid mode of education to fully virtual learning and assessment environments within an extremely short amount of time. This migration was exceptionally difficult, as it took place halfway through the academic or school year in most countries. While pandemic restrictions currently vary across different regions, the 2020-2021 academic session continues to pose challenges despite the experience gained. In addition to a review of the current state-of-the-art in relation to the effects of COVID-19 on teaching and learning, this paper reports on an empirical study carried out in 26 countries (from Asia, Europe, Africa, and America), by 36 academics from 29 academic institutions. Through an extensive global survey of college and university students, information was collected about the challenges (technological, economic, psychological) faced by them, as a result of the pandemic. We also asked the students to offer their ideas and suggestions for further improvements in teaching and learning, as we look toward a post-COVID-19 world.

In this paper, we address issues relating to the availability of, and accessibility to, necessary digital technologies (e.g., learning and communication platforms), isolation, disconnection, and loneliness among students, the overall impact of the pandemic on learning and academic performance, and the reliability of assessment methods, cybercrime dangers and fake information. A total of 1005 responses to the survey were received and analysed. The results are presented in this paper together with reflections of the authors. The paper concludes with a summary of suggestions for process improvements in distance education, and the need for preventive preparedness in the post-COVID period.

Keywords: Distance mode education, e-learning, cyber-protection, rapid migration, socio-digital divide, inequalities, Covid-19 pandemic.

1.0 Introduction

1.1 Worldwide Impact of the COVID Pandemic on Education

According to a 2020 UNESCO report [1], the enormity of the COVID-19 challenge was demonstrated by the fact that nearly a billion and a quarter (which is 67,7 % of the total number) of learners at all levels of education were affected by the coronavirus pandemic worldwide.

During the first few months of the pandemic, a group of 33 academics from 13 countries carried out a study of the immediate challenges and actions experienced by the educators, who were required to ensure that online delivery was enabled within a very short period of time without compromising the quality of education. The study examined what learning technologies were used, what problems and tensions appeared, what institutional supports were available, and the solutions and best practices that were employed during the initial online pivot. These findings were reported in [2], which offered a snapshot of practice across the world in the aftermath of the pandemic's first phase.

Undoubtedly, the changes in student learning and Higher Education (HE) in the Coronavirus era are worth reporting and examining from different viewpoints. During the worldwide migration to virtual/remote learning in HE, a number of educational reports and research papers have highlighted the effects of the pandemic on formal and non-formal learning in Colleges and Universities across the world. Some reports and papers also include detailed data on the experiences of students and teachers and their views on the rapid socio-technical and pedagogical developments.

One such example is found in Oyedotun (2020) [3], who suggested that the sudden transition from traditional teaching to online distance learning due to COVID-19 has required a simultaneous change in pedagogy. Developing countries, such as Guyana, have exposed not only inequalities and challenges related to online learning, but also benefits accruing from these sudden changes.

Her paper presented an excellent overview of the complex educational challenges, benefits, and mitigation strategies experienced in Guyana during the first year of the pandemic. They included the following factors, which are likely to be recognised by educators and students in other countries:

a. Lack of resources (students and teachers):

- **Digital inequalities** among students and teachers, because there is no internet accessibility in many of the villages.
- **Unavailability of computers, laptops and/or tablet facilities, cameras and microphones** for students and teachers.
- **No adequate prior training regarding the requirements of distance mode education** for both students and teachers.
- **Impossible to use lab or fieldwork because of social distancing**. Courses that required the use of lab, fieldwork or practical exercises were seriously affected.

b. Poor national infrastructure:

- **Slow internet speed** because of
  - sudden and unprecedented internet traffic,
  - internet providers were not prepared for the sudden enormous demands on their services.
- **Inconsistent power supply**

c. Course delivery problems:

- **Reduced student–teacher engagement**
- **Slow and extended work:** Students unable to submit assignments, lecturers unable to keep up with their schedules (power-cuts and internet problems)
- **Compromise with deadlines and standard expected of their delivery.**
- **Limited opportunity for monitoring assessments**: use of multiple-choice questions (MCQ) instead.
- **Malpractices** usual because of the limitation of the technological devices

d. Context problems

- **Inflexibility of students and teachers.** They found the online method burdensome and felt stressful to adjust to online education.
- **Domestic affairs**: Working from home was an enormous distraction and challenging due other domestic issues for both students and teachers [4].
- **Mental health challenges:** Depression, mental health issues, and suicidal thoughts increased due to difficulties to cope with the combination of academic rigour and domestic challenges.

e. Cybersecurity problem

- **Cybersecurity threats:** exposure to viruses, hacking potentials, and other cybersecurity threats [5].

f. General benefits

- **Use of online resources,** such as Moodle and other platforms that were under-utilised before COVID-19, and search for information and materials through online blogs, papers, websites, and other related resources.
- **Live cloud recordings** of teachings, meetings, lectures, and other interactions.
- **Personal growth**: Improvement of IT skills
- **Creation of Training sessions** by the university's Software Department for lecturers on various forms of digital learning and education.
- **Sharing of materials and videos** for the benefit of lecturers by colleagues
- **Upgrading of new technologies for the university**: purchase of many new facilities and licenses, especially add-ons, to support Moodle and Zoom video conferencing,

g. Pedagogical benefits/changes

- **Investigation of different learning options** by both students and teachers regarding technology use and other online tools for instruction and learning
- **Investigation of blended learning approaches** by lecturers and the university administration
- **Investigation of different options for working remotely.** Engagement outside the limits of a traditional university classroom.

h. Mitigation recommendations:

- **Recognition of disparities in technology availability** among students and teachers. The World Bank (2020) [6] argues that most students will have difficulties in transitioning to and accessing online education because of lack of internet access and other disadvantages
  - **Flexible rules as students migrate to online platforms.**
  - **Provision of** technical assistance
  - Provision of internet hubs by government at strategic and safe public places in the communities where students can access the needed academic and educational services.
  - Support regarding the provision of infrastructural tools including hardware and software support systems development and application of technology to enhance qualitative teaching and learning.
- **Gradual transitioning** to reduce tension and stress.
- **Practical training sessions:**
  - Education boards and university authorities should offer free training via media such as television, radio, newspaper, social media, etc.
  - step-by-step guidelines for use of platforms translated to native languages spoken by students to enable.
- **Exploration of mobile teaching/learning possibility.** For example, University of Bologna, Italy, distributed free SIM cards to students for mobile learning [7].
- **Striving to make staff and students comfortable** through:
  - **reduction in excessive demands and** workloads for both students and staff.
  - **Restructuring of teaching content:** preventing the teaching contents from becoming burdensome, repetitive, non-engaging, and resulting in learning being resisted
  - **Bearable schedules**: The faculty should break down contents in shorter slots for easier online delivery and management.
  - **Alternative assessment,** such as virtual presentations, interaction models, oral presentations, creative projects using 3-Dimensional modelling and graphics, skits or plays, blogpost journaling, one-to-one conferencing.
  - **Changing grading with letters or numbers to credit and no-credit**

Examples of other recent studies relating to the educational impact of the pandemic include Lily et al. (2020) [8], who investigated the research question "*What are the ramifications of implementing distance education amid coronavirus*?" focusing largely on the experience of Arab cultures. Their research compared traditional distance education (TDE) to Crisis Distance Education (CDE), in addition to critically analysing CDE, and examining the social impacts related to it. The study findings revealed multiple ramifications of CDE, which were captured in a detailed graphic (see Figure 1).

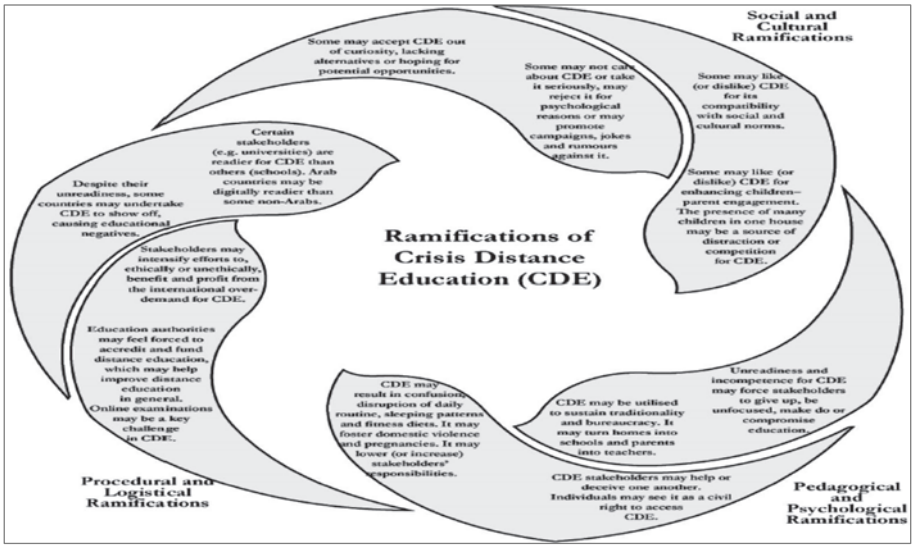

Figure 1. Conceptual Framework for Crises Driven Distance Education (Lily et al. (2020) [8]

A further study by Aguilera-Hermida (2020) [9] on the east coast of the United States focused on college students' perceptions of their adoption, use, and acceptance of emergency online learning. Both quantitative and qualitative data were collected via a 36-item questionnaire from 270 students and factors such as attitude, affect, motivation, perceived behavioral control, as well as cognitive engagement were explored. Aguilera-Hermida [9] suggested that perceived behavioral control is the capability and effort of students to facilitate conditions that affect the ability to use educational technologies and include ease of use, self-efficacy, and accessibility to technology.

The findings from the quantitative data gathered for the study showed that attitude, motivation, self-efficacy, and use of technology are significant in the cognitive engagement and academic performance of students, who preferred face-to-face learning over online learning. Key situational challenges were identified in the qualitative data as concentration difficulties living at home, stress balancing life, and financial hardship, while online educational challenges focused on the general difficulties associated with this mode of learning, as well as increased workload and distractions. Students also described struggling with motivation and negative emotions. On the positive side, the students reported, amongst others, increased family time, greater focus on self-care and personal growth, hobbies, and gaining new skills as beneficial side-effects of the online pivot. The paper also offered several suggestions for practice, to improve emergent online learning. They included the following:

1. Students and teachers should promote a positive attitude towards a temporary situation. They should talk about students' fears and transform them into opportunities. Flexibility, tolerance, and communication are important factors during remote classes.
2. The use of metacognitive conversations is likely to help both teachers and students to monitor the learning process and help individuals to act independently and to make their own free choices for what is happening.
3. Students need to be motivated and encouraged constantly.
4. Increase of accessibility is needed, not only regarding the Internet or a computer; family conditions need to be taken into consideration and training in new tools for both teachers and students is imperative.

Another study by Pragholapati (2020) [10] reported the findings of an online survey carried out in Indonesia, regarding the impact of COVID-19 on nurses and nursing students in Anhui Province. In total, 509 responses were received. The Self-Assessment Anxiety Scale (Carver, 1997) [11] and the Hamilton Depression Rating Scale (HDRS) [12] (1960) were used to evaluate each anxiety and depression symptom. The results showed that around 24.9% of the students had experienced anxiety due to the COVID-19 outbreak. Living with parents/guardians who have a stable family income, as well as living in urban areas were found to be protective factors for students against the anxiety experienced during the pandemic. Knowing a relative or acquaintance who had been infected with COVID-19 was seen to

increase the level of anxiety experienced. Other stress factors were found to be economic stressors and effects regarding daily life. The results also showed that the women appeared to experience more anxiety and fear than the men who participated in the research. Similarly, participants from cities showed more anxiety and fear than participants from the countryside despite the fact that they showed more sadness than the urban participants. The closer COVID-19 was found to the participants, the stronger the anxiety and anger. Comparing nurses to nursing students, nurses were found to have stronger emotional responses and were more willing to focuses on problems. The results of this study are in alignment with the general effects of pandemics on human experience - according to the WHO (2020) [13], the emergence of a pandemic causes stress to various levels of society. A number of other studies related to pandemics (including bird flu and SARS) have shown a negative impact on the mental health of sufferers [14].

Mishra et al. (2020) [15] also carried out an investigation into the online teaching-learning modes adopted by the Mizoram University in India, in relation to the teaching-learning process, as well as semester examinations. The study employed both quantitative and qualitative methods to investigate the perceptions of teachers and students regarding online teaching-learning modes. The study aimed to draw a holistic picture of ongoing online teaching-learning activities during the lockdown period including establishing the linkage between the change management process and online teaching-learning process in education as well as the implementation process of online teaching-learning modes. Twenty-six departments with seventy-eight faculty members and two hundred sixty students participated in the survey to assess their perception towards online teaching- learning. In addition, 20 teachers and 20 students were selected for semi-structured interviews using nested concurrent sampling design [16].

The results of this study showed that students found uploaded videos to be useful, as they can watch them again, pause, and take notes when needed. They also considered that the Google Classroom was the simplest and appropriate way to chat with teachers. Students responded negatively with regard to sufficiently understanding conceptual knowledge and discourse activities. They were not able to maintain the pace of their learning behavior or capacity with the teachers' teaching speed.

The major challenge was related to the unstable network connections, interrupted electricity connections and intermittent signal issues. Some of the students did not have essential resources to join online classes. Level of understanding, lack of scope for meaningful interaction, the range for innovative teaching, and mechanical conduct of classes were significant challenges reported by the teachers. Lack of motivation was perceived by both teachers and students. Teachers also expressed their concerns for laboratory activities that eventually could be arranged with simulation techniques in laboratory practical. Teachers did not know if their students were participating or only had the computer on because the cameras were switched off. The results also showed that online teaching mode is providing the feeling of psychological safety to learning community in COVID-19 afflicting period. The implementation process of the online teaching is shown in Figure 2 [17].

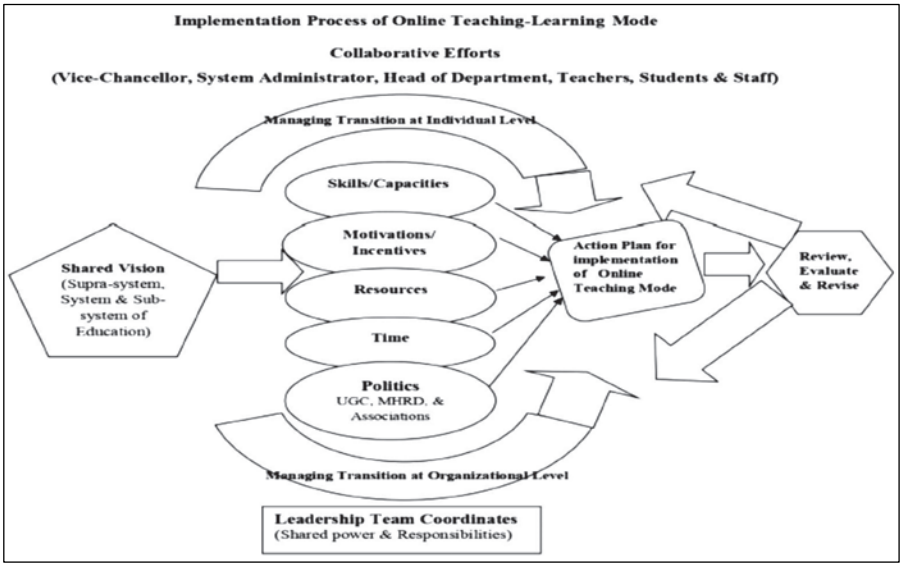

Figure 2. Implementation Process of Online teaching mode (Source: Speck, 1996) [17].

The changing process included: i) either adopting a new online mode similar to other institutions, or ii) innovating one's own. To provide context for the research, the authors of this paper collected secondary data and opinions from published research, reports and policy documents, some of which are outlined above [18, 19, 20]. The majority of these reports and academic papers reported views from academics at all levels of the College/University positions but few have reported the experiences and views of HE students in detail. One of the key motivations for gathering this information in the current study is a serious concern about the persistent phenomena of social exclusion and digital inequality across and within countries, where millions of households do not have adequate access to the Internet, Wi-Fi infrastructure and personal computers, essentially depriving students from continuing with their education during lockdown periods

1.2 The COVID-19 Pandemic Impact on Higher Education Across the World

Primary data was collected through a survey to which 1005 students from 26 countries responded. Students were invited to voluntarily and anonymously complete an online questionnaire which explored problems and challenges relating to the availability of and access to communications and learning platforms, also in addition to their experiences, their ideas, and suggestions for further improvements.

The paper presents findings relating to the availability of and access to the necessary technologies (learning and communication platforms), issues of isolation, impact on performance, and reliability of assessment methods, cybercrime dangers and fake information. Comparisons between countries are made as existing socio-economic inequalities, and the socio-digital divide have been exacerbated by the pandemic [21, 22, 23].

2.0 The Purpose, Design and Challenges of the Study

2.1 Purpose and Design of the study

In the early days of 2020 soon after the eruption of the COVID-19 pandemic the challenge to rapidly convert the pedagogic model from traditional face-to-face or hybrid to fully virtual demanded unprecedented effort from universities and educators in order to support their students' education. We studied the impact on educators and reported our findings in Georgiadou et al., 2020 [2]. In 2021 we focus our attention on the way students' learning and well-being were/are affected. Our aim was to involve as many students as possible from many countries across the world, in order to make comparisons and make useful suggestions based on the understanding gained through the study.

The study involved a literature review (referenced throughout the paper) for collecting secondary data, and a survey research method using a questionnaire for collecting primary data. To provide context for the research, the authors of this paper

collected secondary data and opinions from published research, reports and policy documents, some of which are outlined in the previous section [18, 19, 20]. The majority of these reports and academic papers reported views from academics at all levels of the College/University positions, but comparatively few have explored the experiences and views of HE students in depth. One of the key motivations for gathering information from students in the current study is a serious concern about the persistent phenomena of social exclusion and digital inequality across and within countries, where millions of households do not have adequate access to the Internet, Wi-Fi infrastructure and personal computers, essentially depriving students from continuing with their education during lockdown periods. Below, we describe the design of the questionnaire and the analytical framework employed for the data.

2.2 Questionnaire Design

The questionnaire was initially designed as a document with most questions presented in tabular form, comprising six (6) axes namely Demographics, Facilities, Learning, Communication, Privacy and Security, and a final section prompting for Free text so that students could express their anxieties and problems and could express their views and suggestions for improvement. This all-encompassing approach generated a 10-page long questionnaire (taking from 40-50 minutes to complete). The length of the questionnaire was later proved to be a deterrent factor. The initial questionnaire was converted to an online format using Google Forms. Strict ethical rules for ensuring voluntary participation, anonymity and non-traceability had to be observed, according to the ethics protocols of the participating institutions. In order to submit a formal application to the Research Ethics Committee of Middlesex University, London UK the questionnaire had to be converted to the Qualtrics platform. This process took a long time. Upon obtaining the ethical approval it was shared with colleagues from other institutions and other countries which also require such approval locally. Obtaining ethical approval at Middlesex University helped to expedite local approvals elsewhere. Finally, students in China were unable to access Google, due to a recent decision by the Chinese government. Thus, the questionnaire had to be transferred to the Chinese platform Wen Juan Wang (问卷网).

Colleagues from across the world were asked to motivate their own students, many of whom were reluctant to do so ‘since there is nothing in it for us’ as one of the students said. Several other students from a range of countries expressed the same view, and it proved challenging to recruit participants, although some countries had more success than others. It is also likely that some students are experiencing “survey fatigue,” as many institutions have carried out their own internal research into their students’ views and experiences of online learning during the pandemic, and the students may have been asked to complete multiple questionnaires during the past year.

Despite these difficulties it was encouraging that 1005 students from 26 countries responded.

3.0 Analysis of Data

As described above, the questionnaire was designed to include six (6) axes namely Demographics, Facilities, Learning, Communication, Privacy and Security, and a final section where students could express their anxieties and problems and express their views and suggestions for improvement. Responses came mainly from Google forms but also from Qualtrics and Wen Juan Wang all the responses were combined in an EXCEL spreadsheet which was used for the analysis of the data and their graphical representation.

The results are presented in diagrammatic form together with a brief discussion and explanation for each, in 6 sections corresponding to the six axes of the investigation:

3.1 Demographics

3.2 Facilities

3.3 Learning

3.4 Communication

3.5 Security and Privacy

3.6 Students' Views, Reflections, Ideas and Suggestions

3.1 Demographics

Figure 3 shows that the sample data was slightly dominated by female participants.

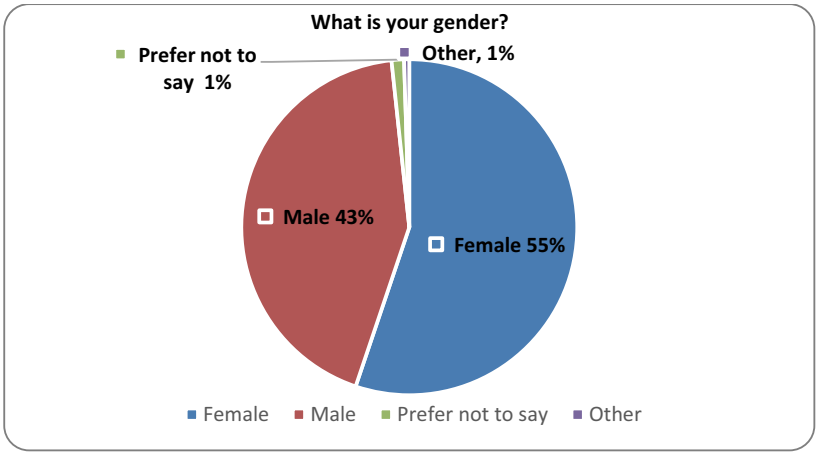

Figure 3: Gender of sample data

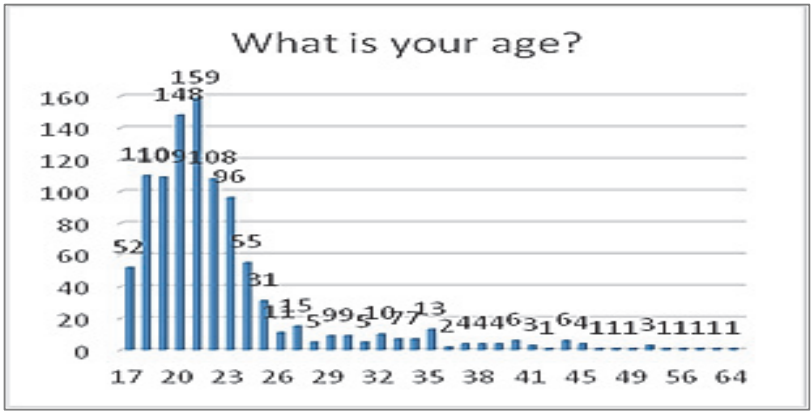

Figure 4: Age distribution of sample data

Figure 4 shows the age distribution of the sample participants ranged from 17 up to 59 years, while the majority were between 18 and 23 years old

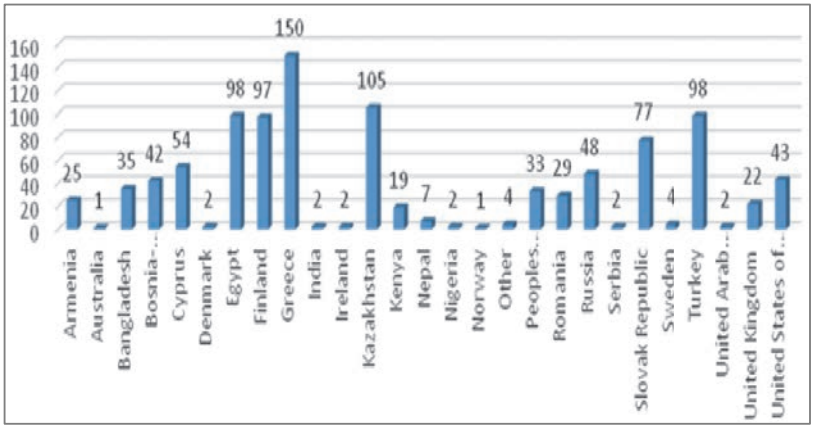

Figure 5: Country of Study

The main responses were collected from the following countries [Figure 5] listed in descending order: Greece (150), Kazakhstan (105), Egypt (98), Turkey (98), Finland (97), Slovak Republic (77), Cyprus (54), Russia (48), United States of America (43), Bosnia- Herzegovina (42), Bangladesh (35), Romania (29), Armenia (25), Kenya (19), and United Kingdom (13). Due to the fact that there was an irreconcilable disparity between the number of responses between countries, comparison of the responses between countries was not possible. Thus, we focused on the global dimension of the responses.

The sample contained students' responses majoring in 26 different subject areas. The main subjects of the respondents were Business (131), Computing, (129), Engineering (125) and Psychology (93).

3.2 Facilities

Online learning requires availability of and access to the necessary equipment, reliable internet connection and knowledge of how to engage in communication and learning. This section of the study aimed to identify the differences between the **before** and **during** the pandemic reality.

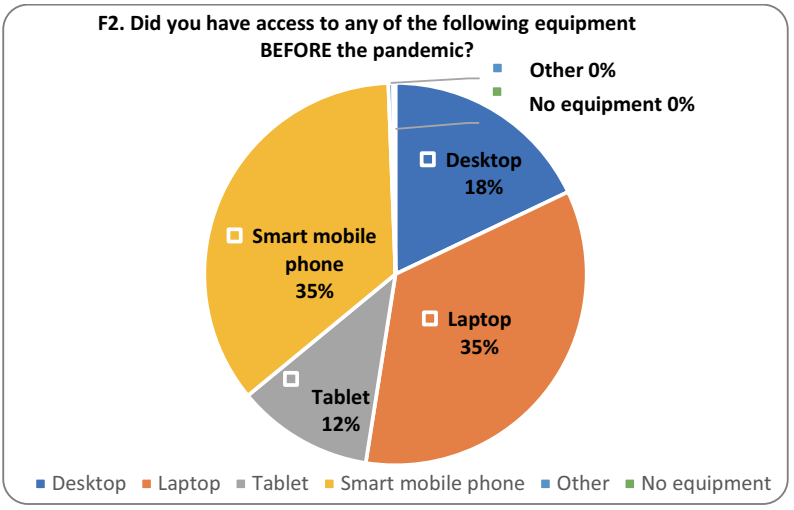

Figure 6 (a): Access to equipment BEFORE the pandemic

Figures 6 (a) - 6 (b) show that there are minor differences in the access to equipment before and during the pandemic. Some students have access to several devices.

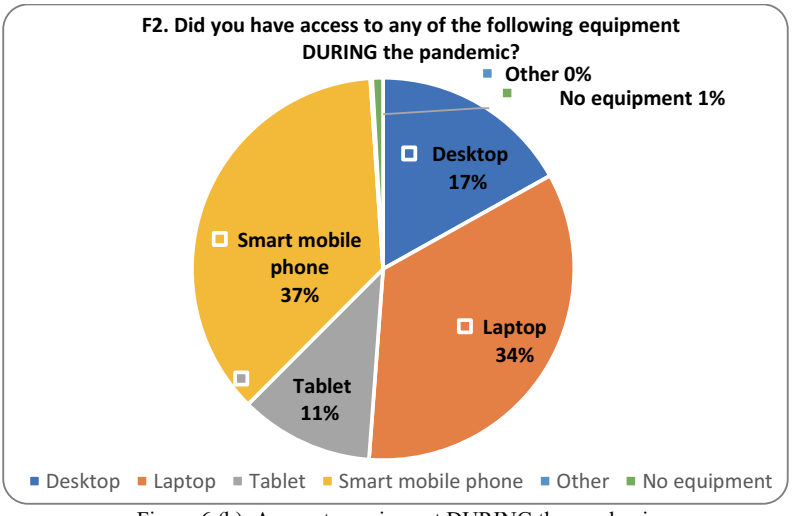

Figure 6 (b): Access to equipment DURING the pandemic

Figures 7 (a) and 7 (b) shows that more than half of the respondents did not need any equipment upgrades.

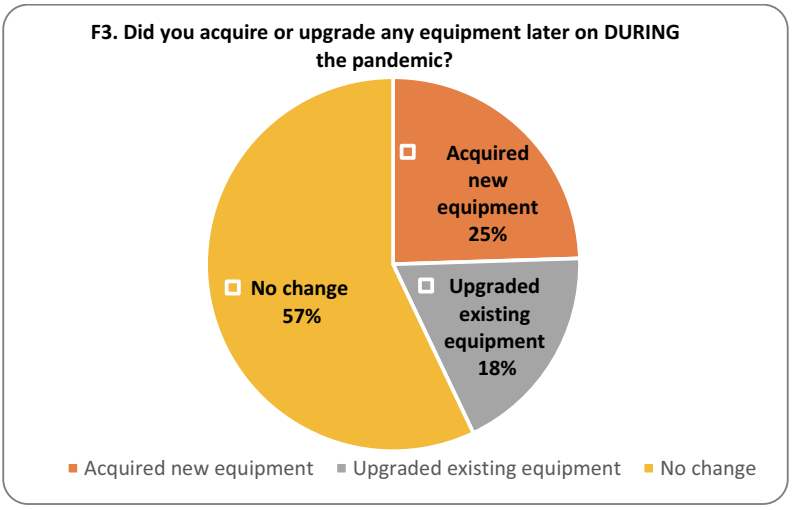

Figure 7 (a): Acquire and upgrade of equipment during the pandemic

Also, in more than 50% of the cases only one person used the equipment i.e. they did not need to share I with other members of their family.

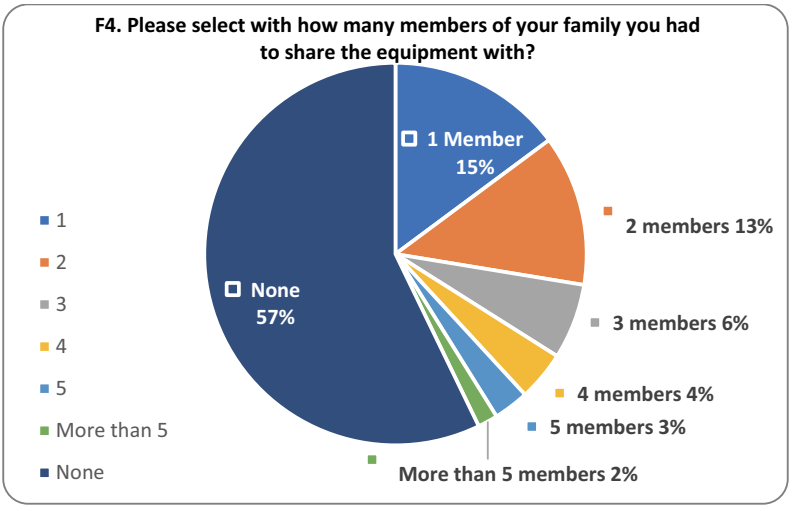

Figure 7 (b): Number of family members using the equipment during the pandemic

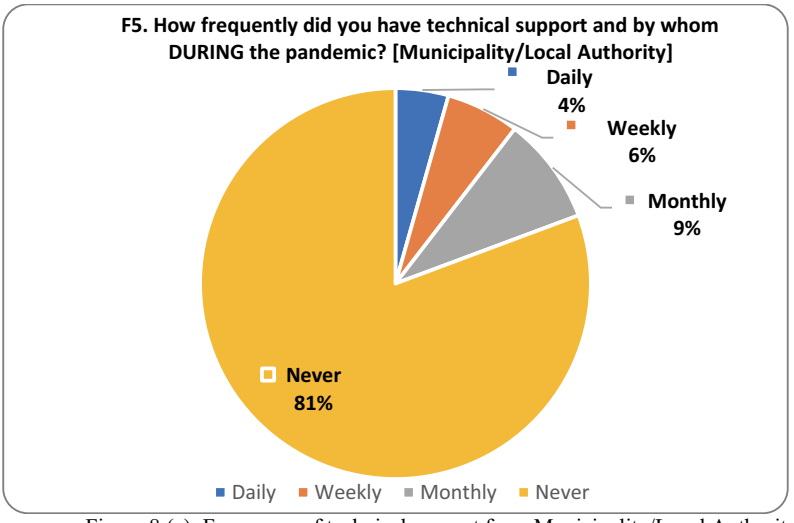

Figure 8 (a): Frequency of technical support from Municipality/Local Authority

Figures 8 (a) and 8 (b) shows that more than 2/3 of the respondents never received any technical support from Municipality/Local Authority.

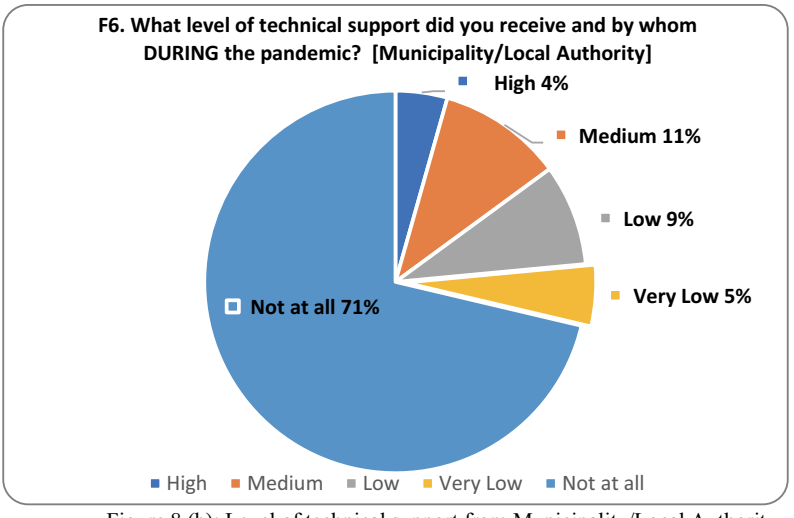

Figure 8 (b): Level of technical support from Municipality/Local Authority

Figure 9 (a) and (b) shows that the majority of respondents never received technical support from charity. Instead, family supported daily, weekly, and monthly in 2/3 of the cases. A third of the respondents did not receive any technical support from family.

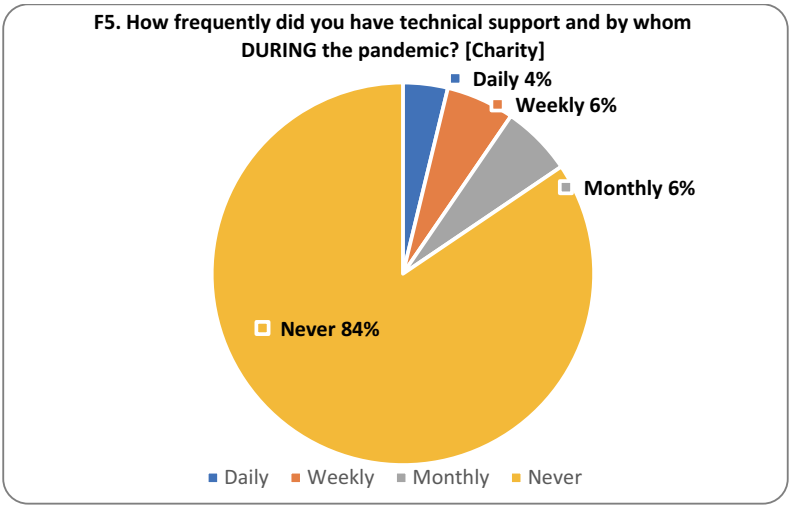

Figure 9 (a): Frequency of technical support by Charity

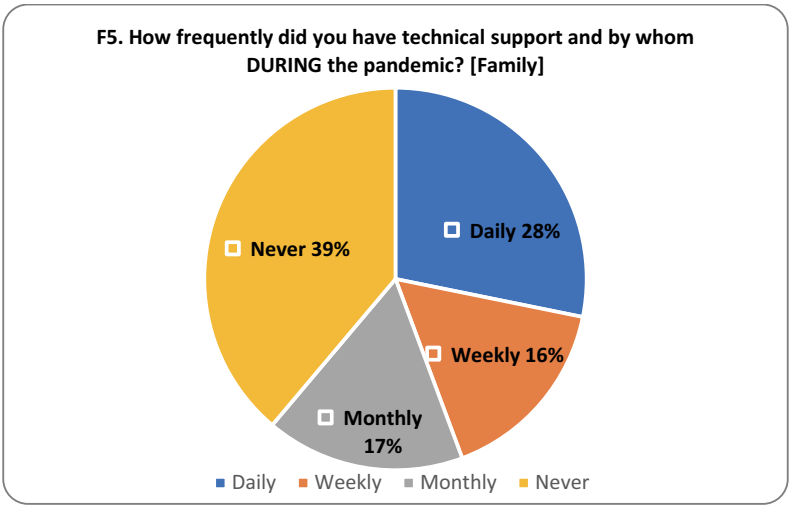

Figure 9 (a): Frequency of technical support by Family

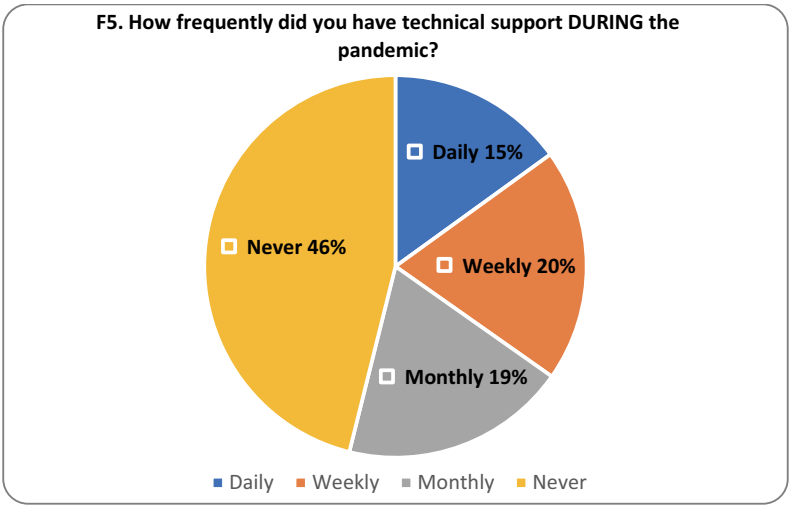

Figure 10 (a): Frequency of receiving technical support during the epidemic

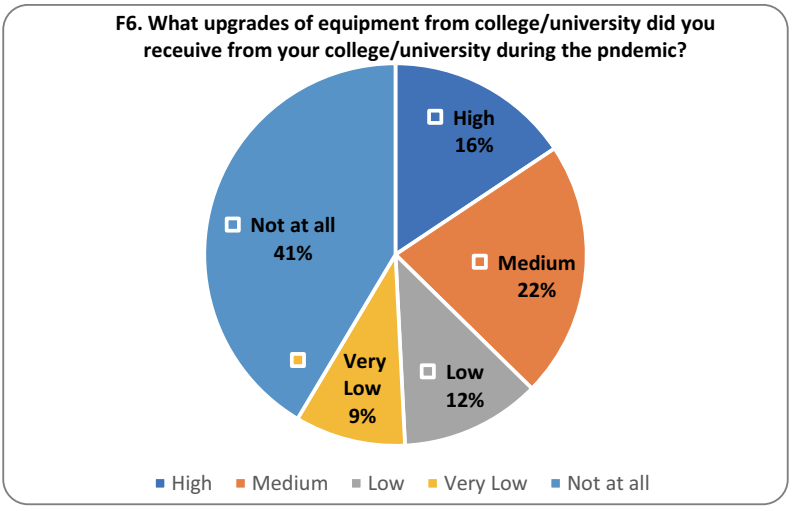

Figure 10 (b): Upgrades of equipment from college/university using the equipment.

The results depicted in figures 10 (a) and (b) show that almost half of the respondents never received any technical support from friends, nor from college or university during the pandemic. The other half received technical support by friend daily, weekly, or monthly to same degree and also from the college-university they received high, medium, low and very low technical support to similar distribution.

3.3 Learning

This section aimed to ascertain whether the students' learning was adversely affected during the pandemic.

Figures 11(a) and 11 (b) show that the majority of students prefer either face-to-face or mixed learning styles. They consider that lectures are best delivered through face-to-face learning.

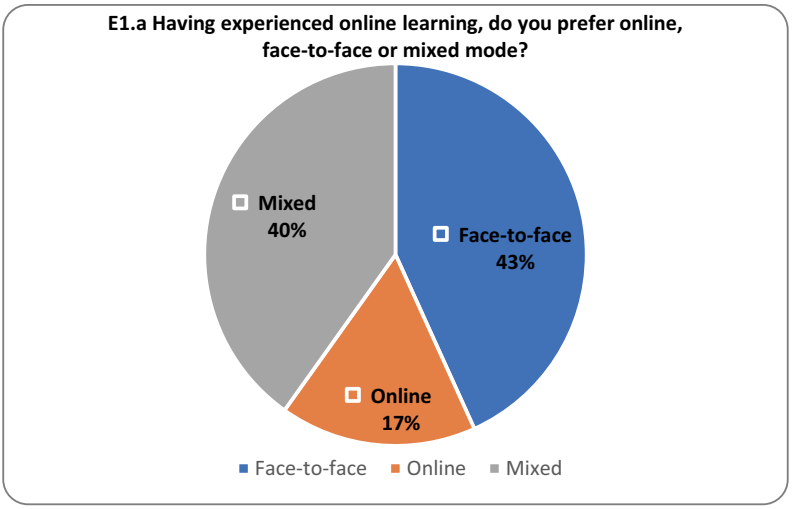

Figure 11 (a): Learning style preference

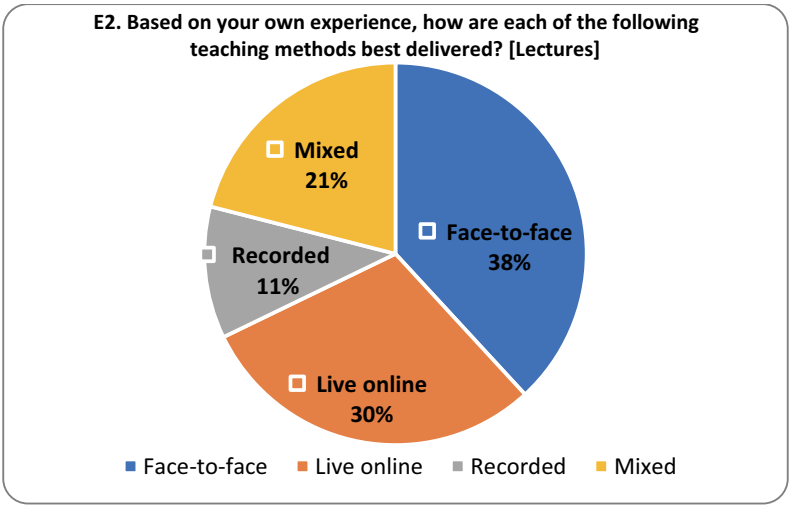

Figure 11 (b): Delivery of lectures

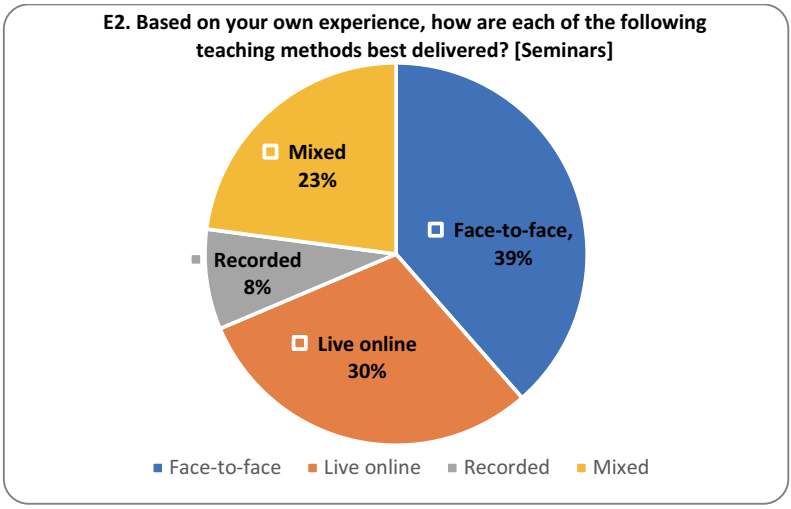

Figure 12 (a): Delivery of seminars

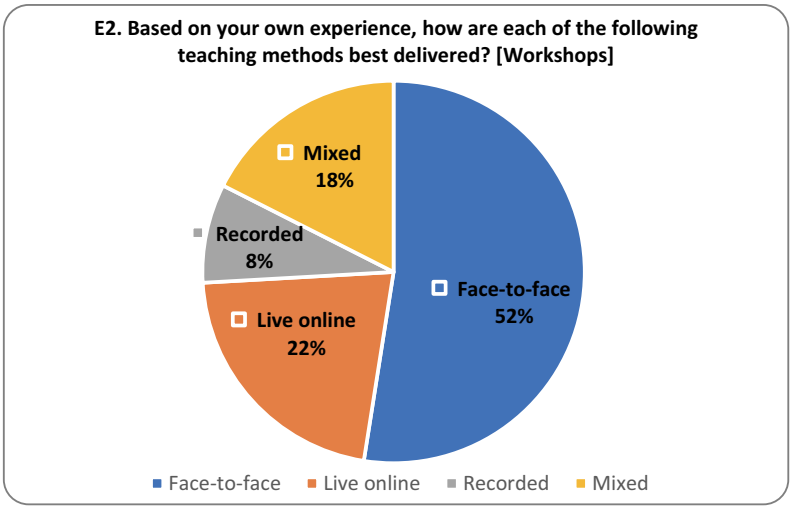

Figure 12 (b): Delivery of workshops

From figures 12 (a) and (b) we conclude that both for seminars and workshops the respondents prefer the face-to-face teaching method.

From figure 13 we see again that face-to-face teaching is preferred by the respondents. A big majority does not believe that the face-to-face teaching method will disappear in the near future.

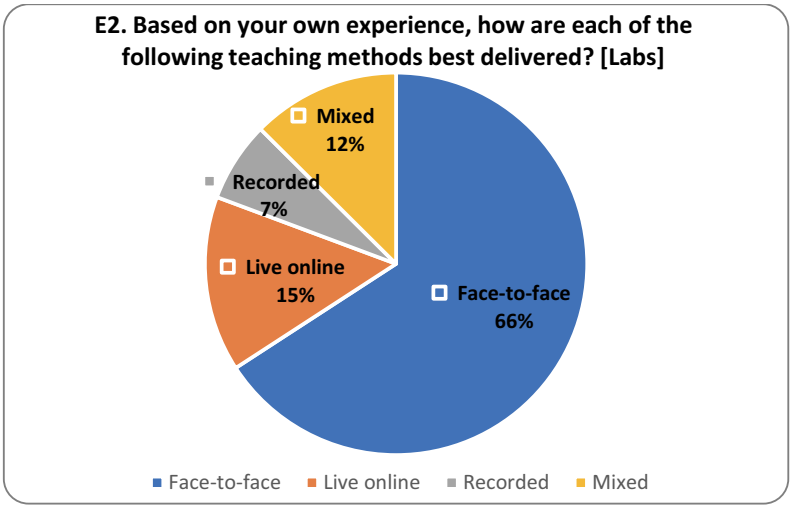

Figure 13 (a): Delivery of labs

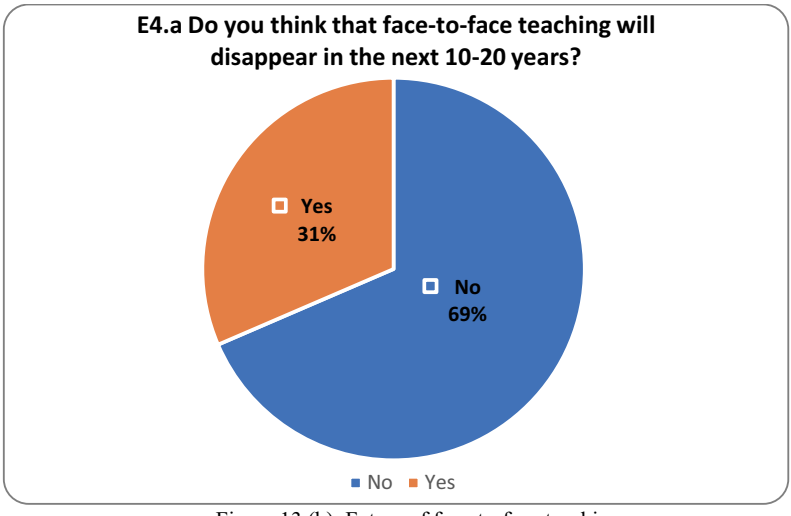

Figure 13 (b): Future of face-to-face teaching

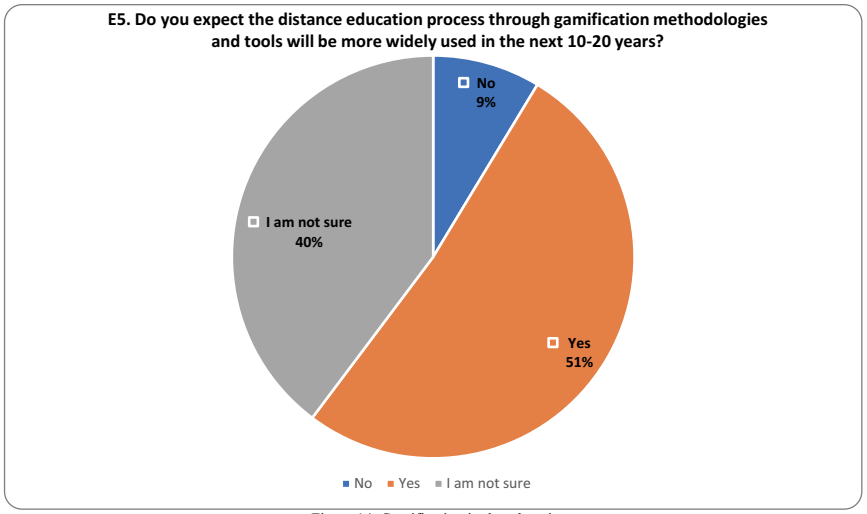

Figure 14: Gamification in the education process

More than half of the respondents believe that gamification will be used in the near future in distance education process.

Figures 15 (a) and (b) show that Live class was used in more than half of the cases during the pandemic. Recorded broadcast learning methods was used weekly in around 40% of the cases, as well as 30% not at all.

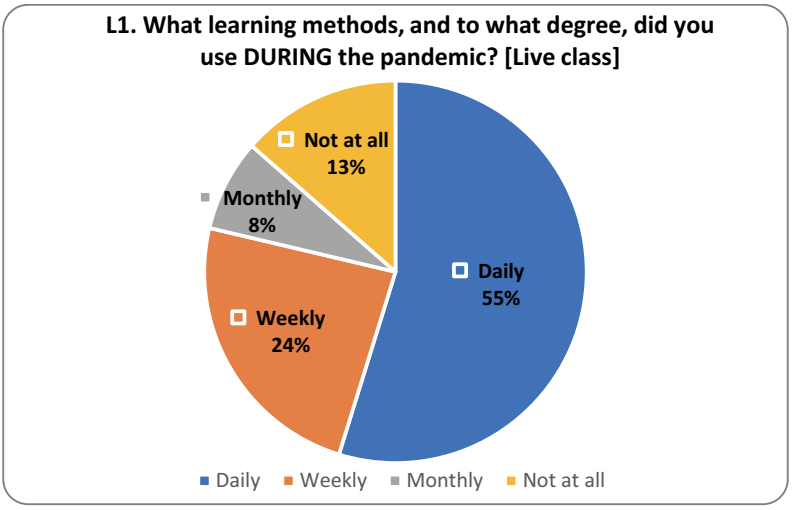

Figure 15 (a): Live class learning methods used during the pandemic

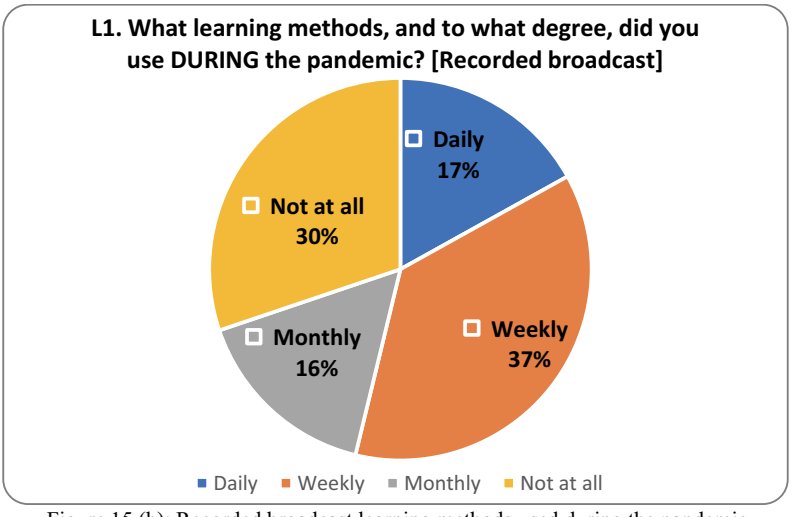

Figure 15 (b): Recorded broadcast learning methods used during the pandemic

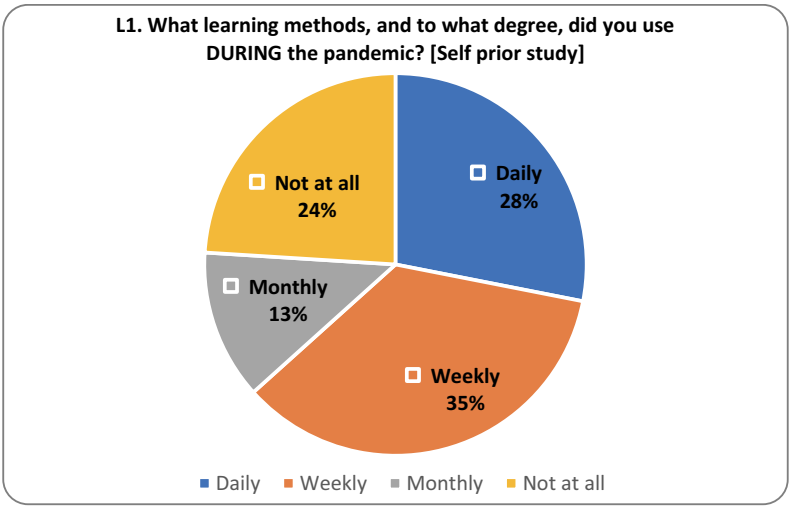

Figure 16 (a): Degree of self-prior study used during the pandemic.

From figures 16 (a) it can be seen that before the pandemic 28% of the students engaged in self prior study on a daily basis and 35% on a weekly basis.

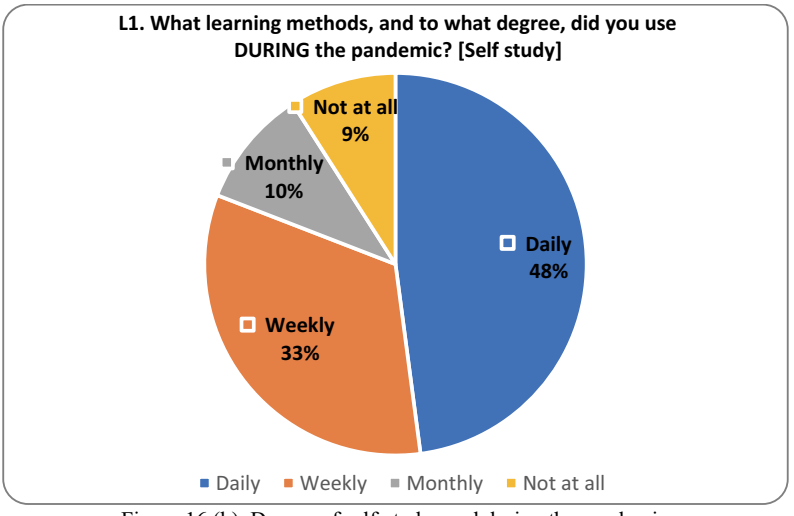

Figure 16 (b): Degree of self-study used during the pandemic.

During the pandemic (see figure 16 (b), the daily engagement in self- study increased to 48% and the weekly self -study had a minor decrease to 33%. The most interesting result however, is the degree of non-engagement in prior self-study which decreased from 24% to 9%. The changes can be attributed to the fact that the daily engagement increased by 20 percentage points.

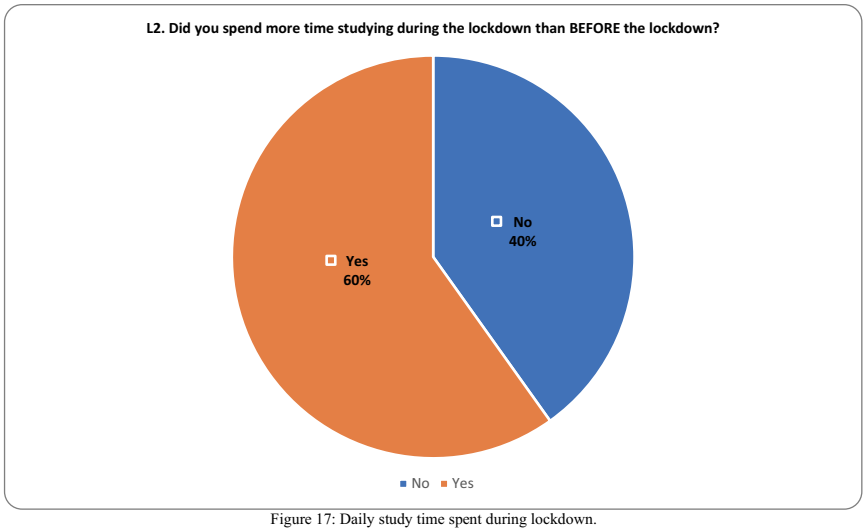

Figure 17: Daily study time spent during lockdown.

Figure 17 shows us that 60% of the respondents spent more time on studying during the lockdown.

Figure 18 (a) shows us that 70% (daily) and figure 18 (b) shows that 79% (weekly) of the respondents spent at least 75% more time on studies during the lockdown.

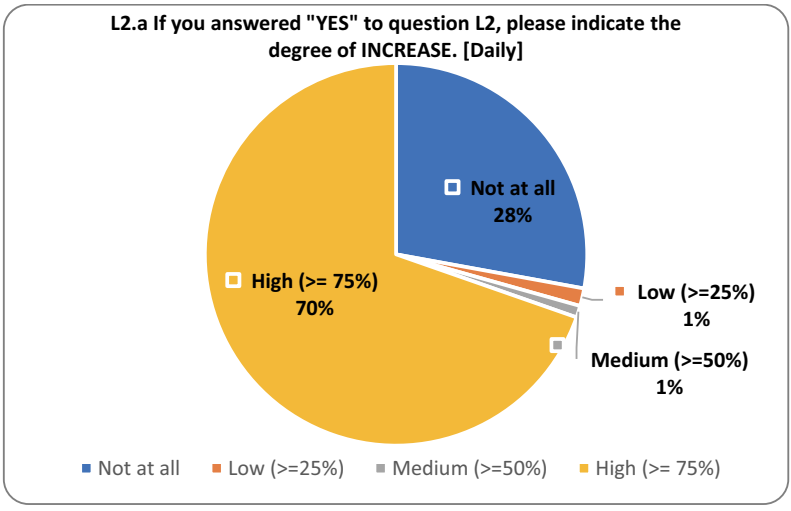

Figure 18 (a): Daily increase in study time during lockdown.

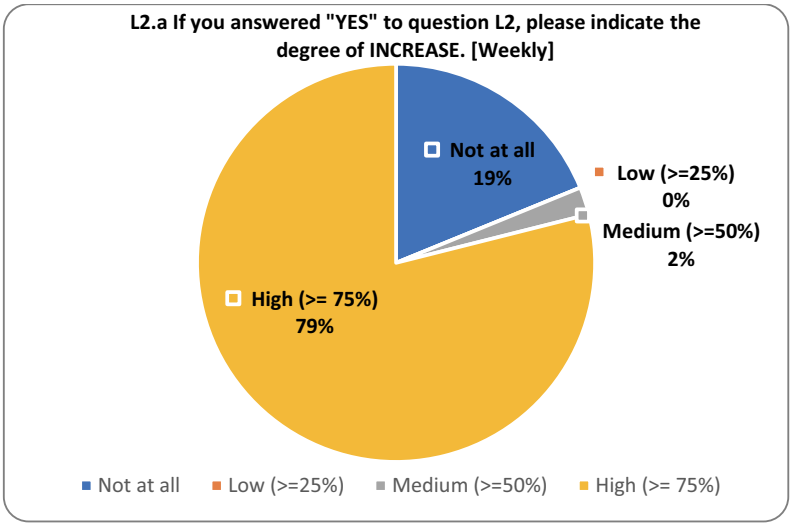

Figure 18 (b): Weekly increase in study time during lockdown.

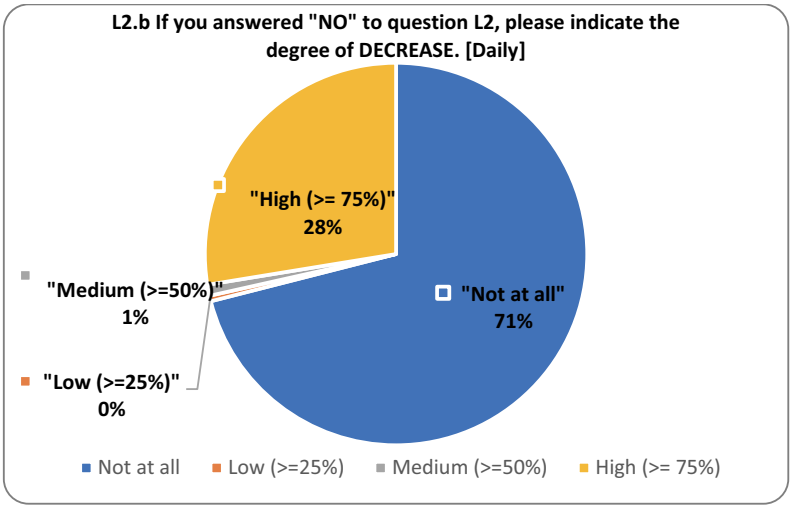

Figure 19 (a): Degree of decrease of time spent studying during the pandemic {Daily]

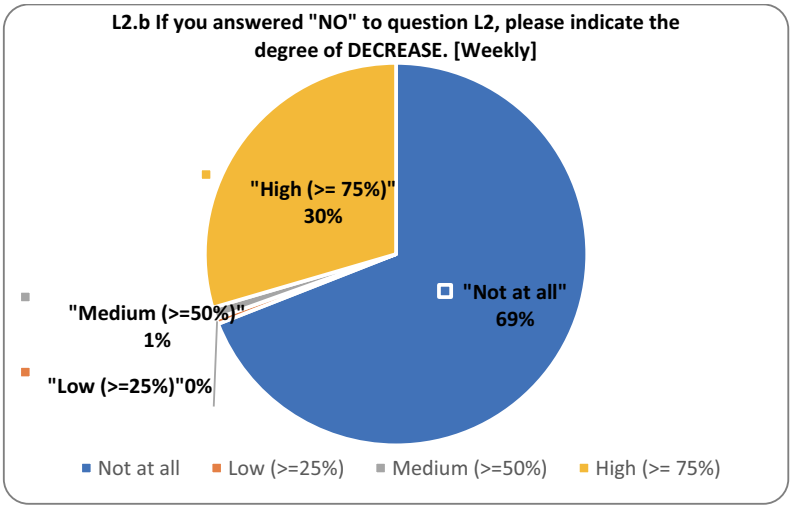

Figure 19 (b): Degree of decrease of time spent studying during the pandemic {weekly]

Figures 19 (a) and (b) show 1/3 of those who spent less time on daily or weekly studies during the lockdown approximately spent 75% less. The majority, however, spent the same time as before the lockdown.

3.4 Communication

This section attempted to establish whether students felt supported, whether they kept in touch with their lecturers, their fellow students, friends and family. There were anecdotal reports that students felt isolated or lost interest in their studies

Figures 20 (a) and (b) show us that communication was encouraged to a high degree both among students and between students and lecturers.

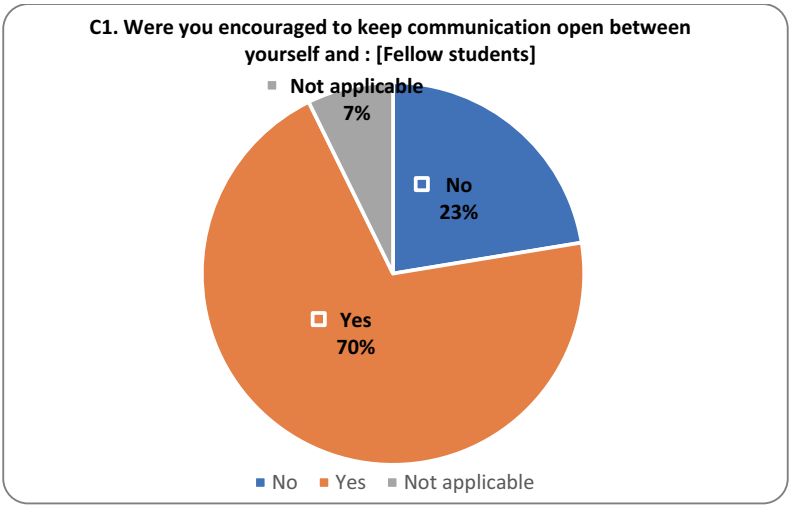

Figure 20 (a): Encouragement of communication between yourself and fellow students

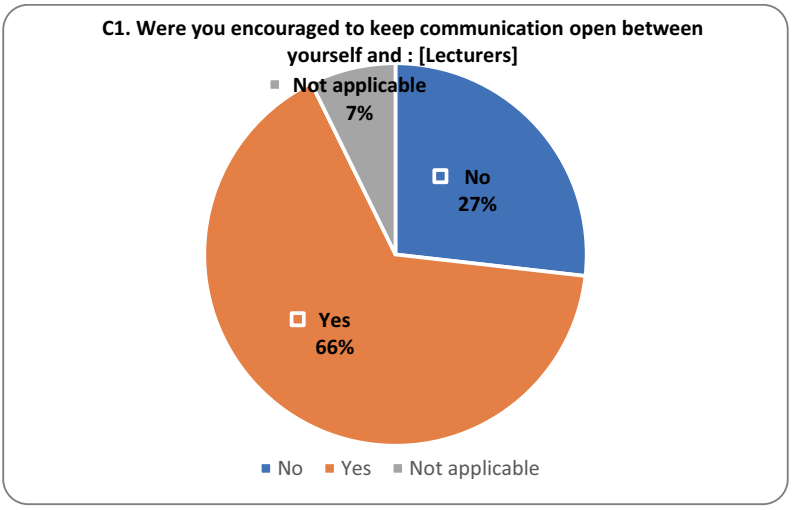

Figure 20 (b): Encouragement of communication between yourself and lecturers

Figure 20 (a) and (b) shows us that communication was encouraged to a high degree both among students and between students and lecturers.

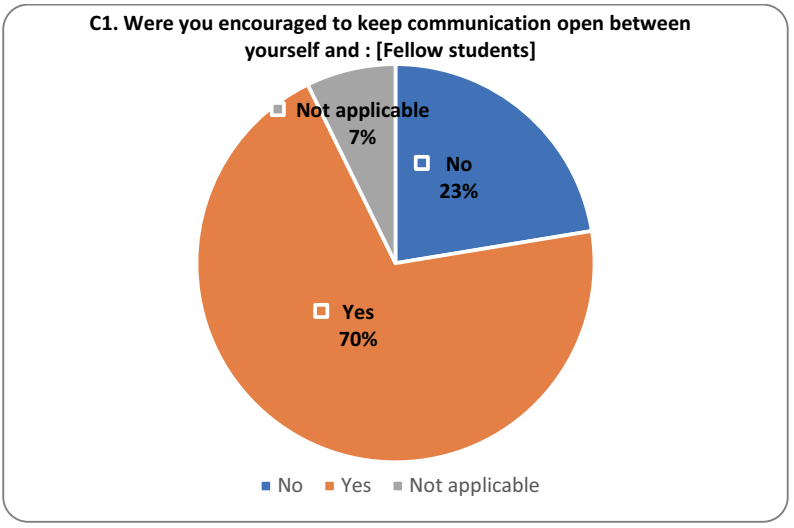

Figure 20 (a): Encouragement of communication between yourself and fellow students

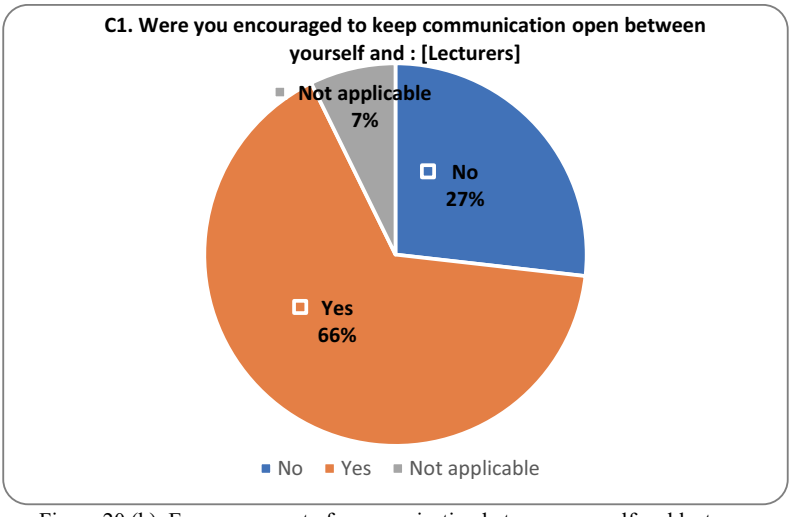

Figure 20 (b): Encouragement of communication between yourself and lecturers

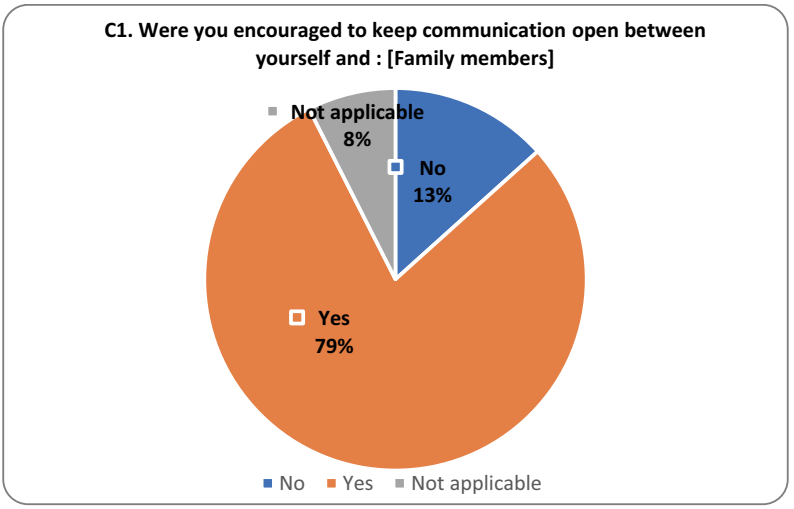

Figure 21 (a): Encouragement of communication between yourself and family members

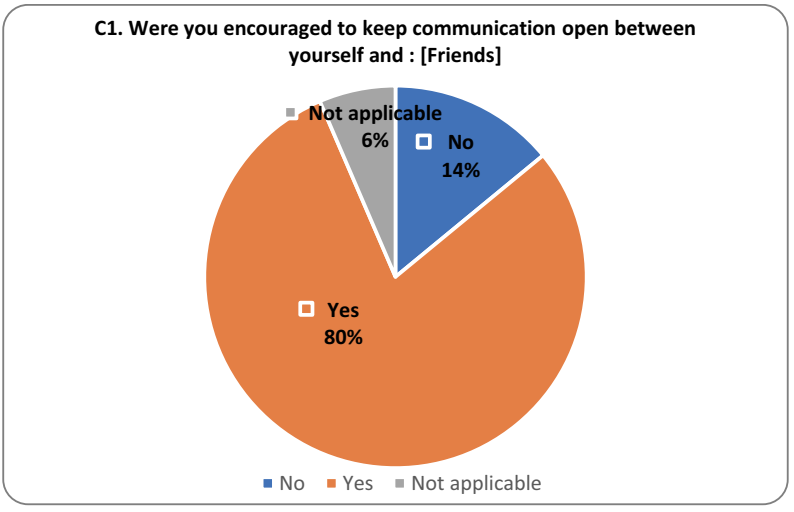

Figure 21(b): Encouragement of communication between yourself and friends

Figures 21 (a) and (b) show that communication was encouraged to a high degree both between students and their family member and between students and their friends. The rationale for posing this question was to understand whether students were challenged by the isolation. Keeping in touch with friends and fellow students as well as family is vital.

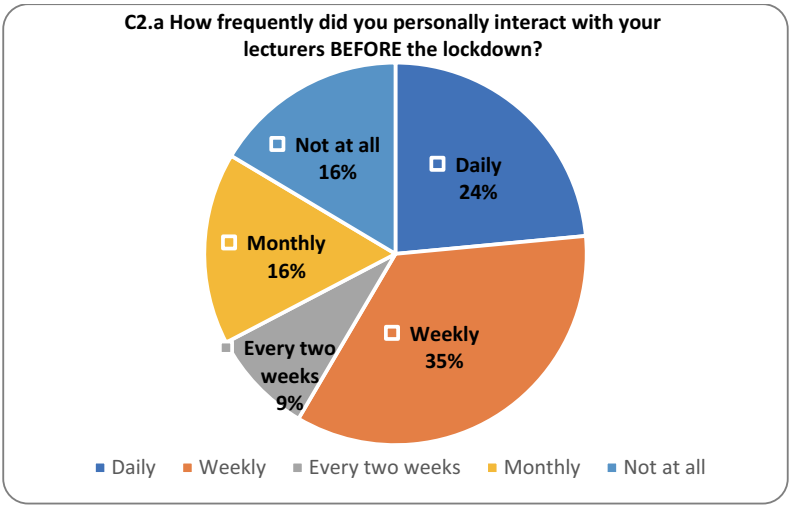

Figure 22 (a): Frequency of communication before lockdown

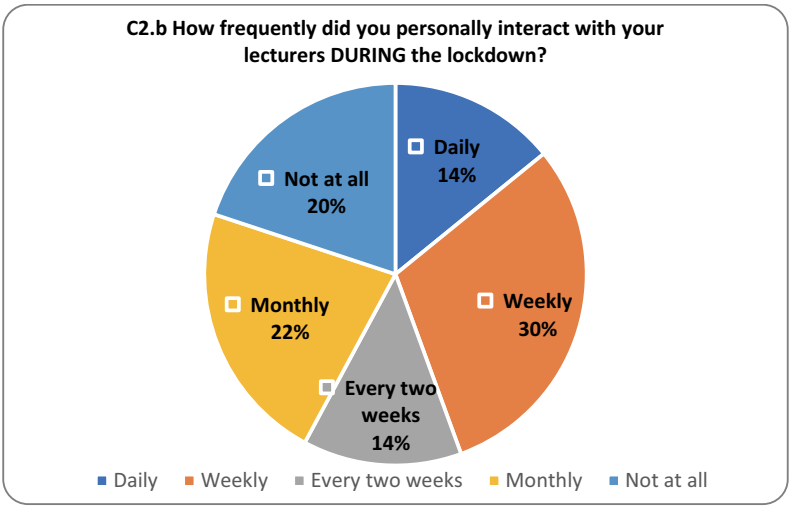

Figure 22 (b): Frequency of communication during lockdown

Figure 22 shows that the daily frequency of communication decreased during the lockdown, However, for the weekly, every two weeks and monthly communication the frequency increased.

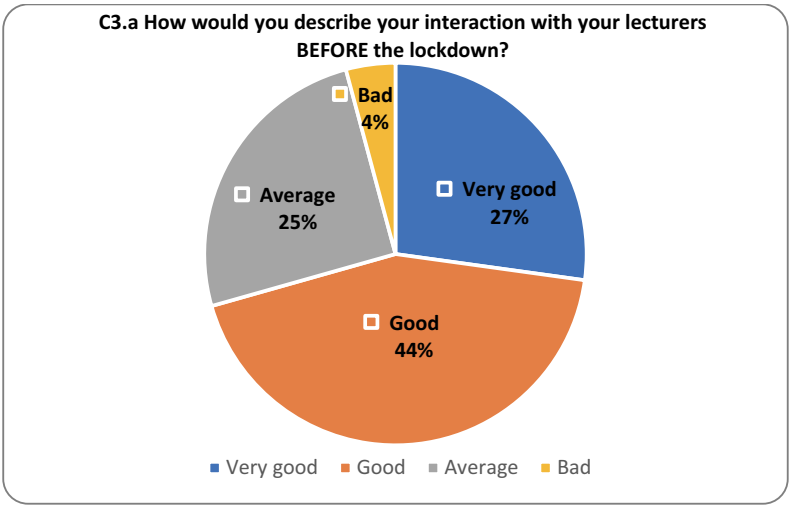

Figure 23 (a): Interaction with lecturers before the lockdown

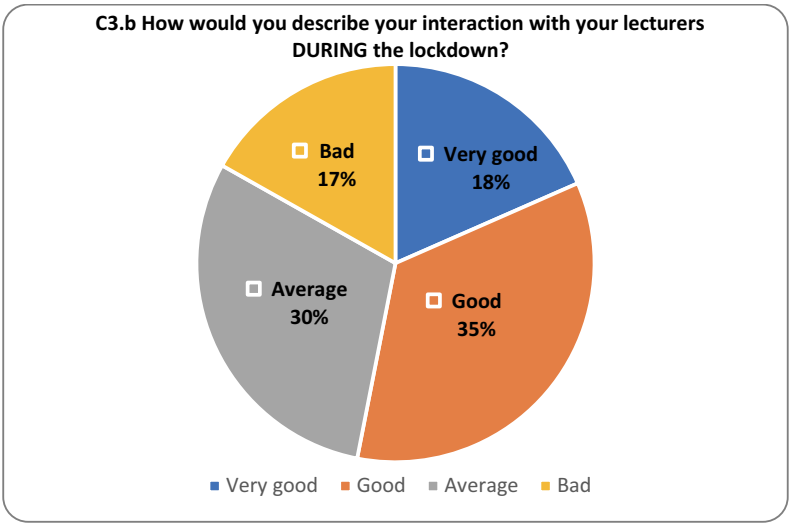

Figure 23 (b): Interaction with lecturers during the lockdown

Figure 23 shows that the quality of interaction with lectures increased during the lockdown.

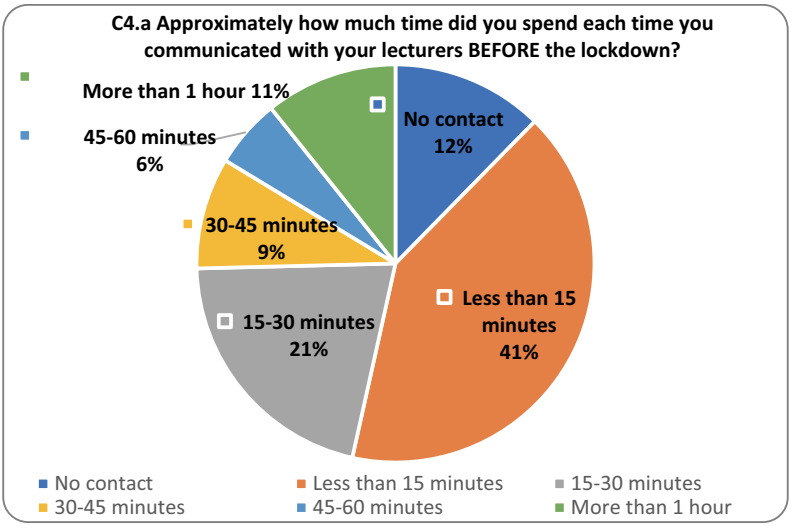

Figure 24 (a): Communication time before the lockdown

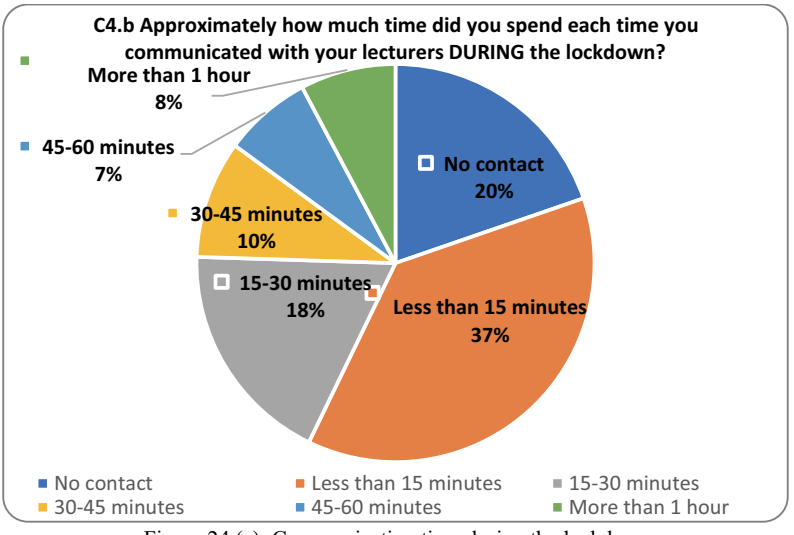

Figure 24 (a): Communication time during the lockdown

Figure 24 shows that more than 1/3 of the students spent less than 15 minutes on communication with their lecturers before and during the lockdown.

This section provided information about the frequency and length of interaction and communication between the students and their lectures, students and their parents and students and their friends. The results showed that as the students were connected, they seem to maintain contact throughout the lockdown periods.

3.5 Security and Privacy Concerns

As distance learning has undergone a spectacular development and use in recent years, especially in the COVID-19 era -when it was even temporarily established-, it is considered of the utmost importance to guarantee security in e-learning [24]. Common examples of cyber security threats mentioned last year by Anghel and Pereţeanu (2020) [25] include data leakage, authentication problems, malware installation, unreliable networks, and other. The European Union Cyber Security Agency (ENISA), in its annual report for 2020, identified fifteen (15) top threats [26], such as cyber-espionage, online identity theft, phishing, spam, data breach and other that compromise online privacy and virtual information.

An important part of cybersecurity is the processing of the personal data of all Internet users, which is regulated by the General Data Protection Regulation (GDPR) of the European Union [27]. Based on the literature there are some best practices and recommendations for organisations that have been identified on the need to implement cyber security policies [28].

3.5.1 Privacy and Cybersecurity Issues in Virtual Learning

In order to facilitate the virtual learning activities, various student activities and information are recorded and digitized that generally do not happen during in-person classroom setting; for example, recording virtual classroom discussions and tracking students' attendance online. These activities, related to collection, storage, and handling of students' personal information have raised the concerns for privacy and protection. This concern is more alarming if we consider the data breach incidents that different companies, including some companies owning the forementioned tools and services, suffer from time to time [29].

Migrating the teaching and learning activities to the Internet invites a plethora of cyber risks and security threats. The following are examples of such facts: i) Distributed Denial of Services (DDoS) attacks affect the access of educational resources, ii) phishing attacks can lead to stealing students'/teachers' login credentials and infect their devices with malware or, even worse, ransomware. Such incidents have been significantly increased during the current pandemic [30]. Likewise, there are inherent security risks (e.g., [31] [32]) connected to vulnerabilities in the Internet tools used for the same deceitful purposes.

3.5.2 Notable Survey Findings regarding Students' Cyber-Protection

The first question was: D1. Are you aware of any measures taken by your University/College about the protection of private data? The students' responses showed that 45% of the participants were not aware of any measures taken by their university/college to protect their private data (figure 25). This fact alone indicates the need for additional awareness training.

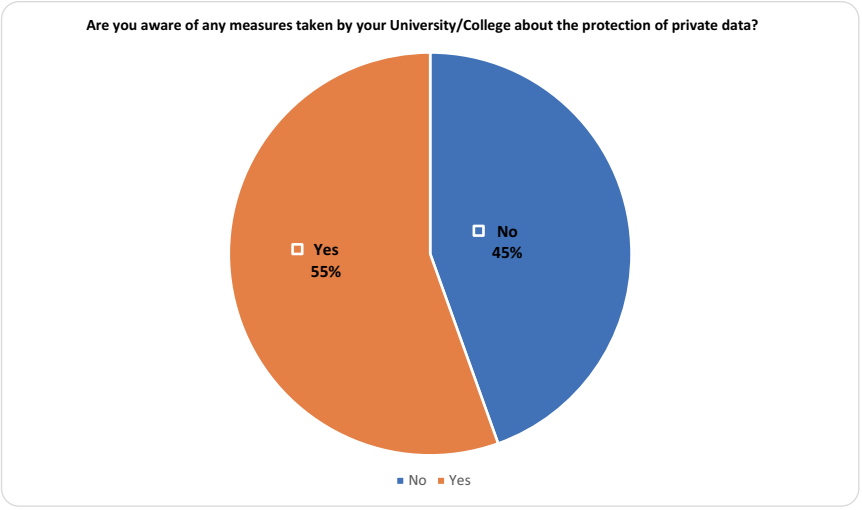

Figure 25: Awareness of measures taken by institutions on private data protection

A large portion of the participants had no awareness training on even basic cybersecurity issues both before and during the migration to online learning, such as phishing attack (before-67.93% | during-73.90%), online privacy (before-64.94% | during-70.22%), secure password (before-62.35 | during 70.52%). More specific details are illustrated and commented in the next figures 26-29.

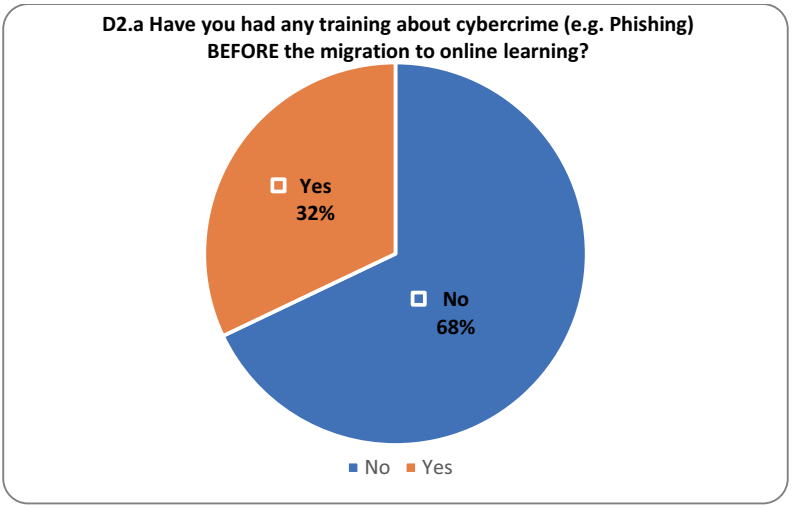

Figure 26 (a): - Training on cybercrime before the migration to online learning

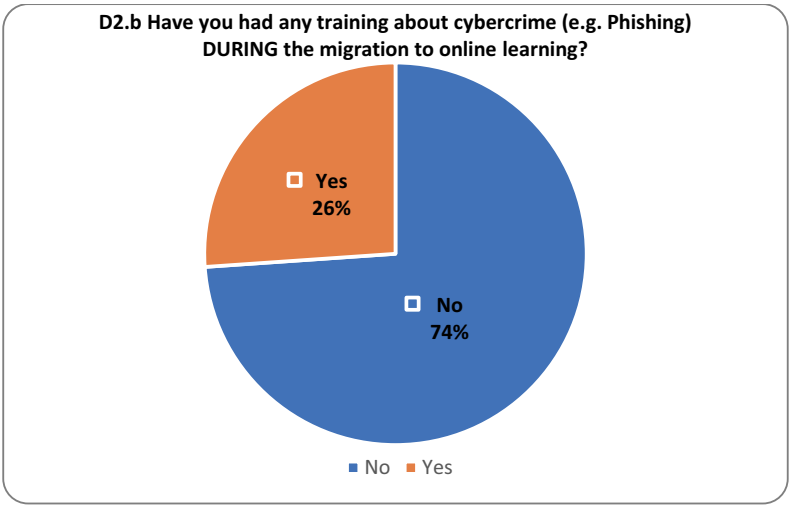

Figure 26 (b): - Training on cybercrime during the migration to online learning

Only 32% (before the migration to online learning) and 26% (during the migration) of the respondents received training on cybercrime again pointing to the need for further action by the educational institutions (figure 26 (a) and (b)).

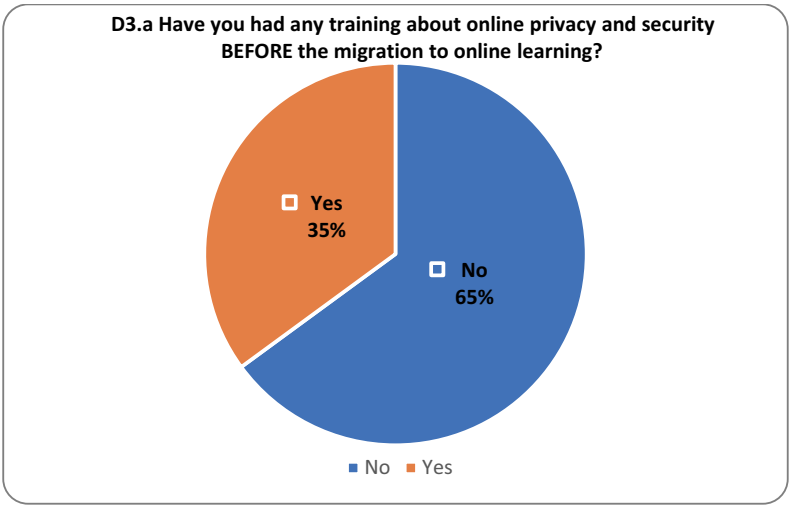

Figure 27 (a): Training about online privacy and security before the migration to online learning

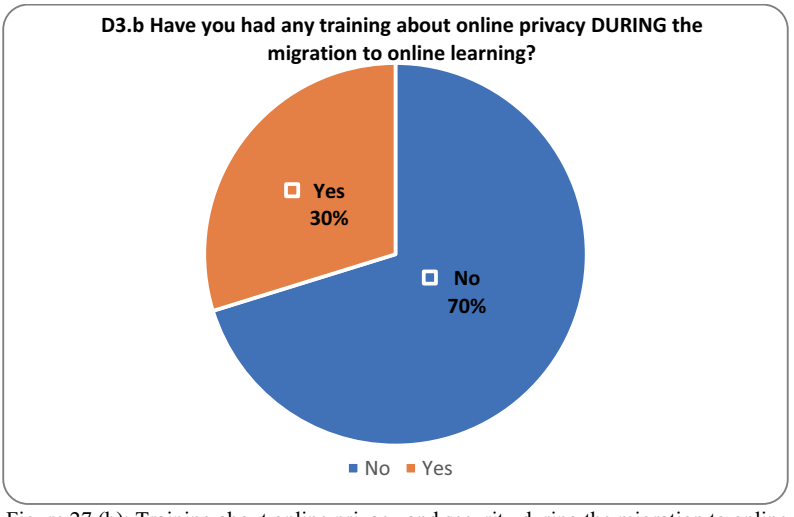

Figure 27 (b): Training about online privacy and security during the migration to online learning

It can be seen that 65% (before the migration) and 70% (during the migration) of the respondents received no training about online privacy and security (figure 27 (a) and (b)).

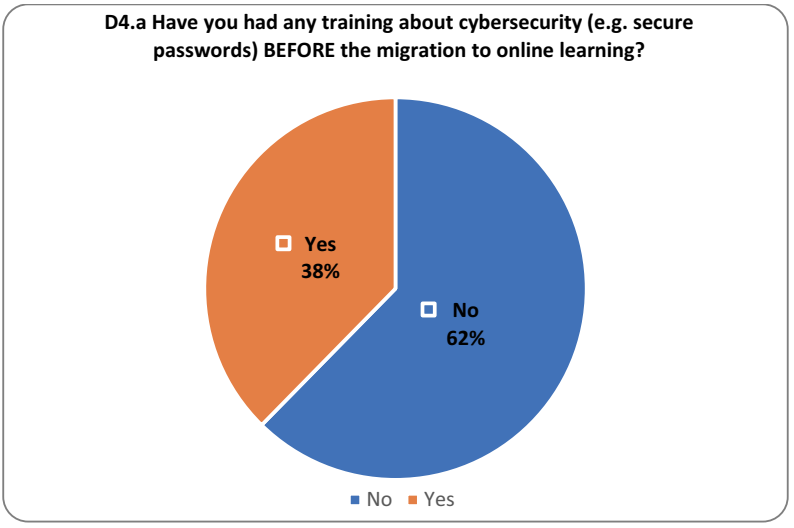

Figure 28 (a): Training about cybersecurity before the migration to online learning

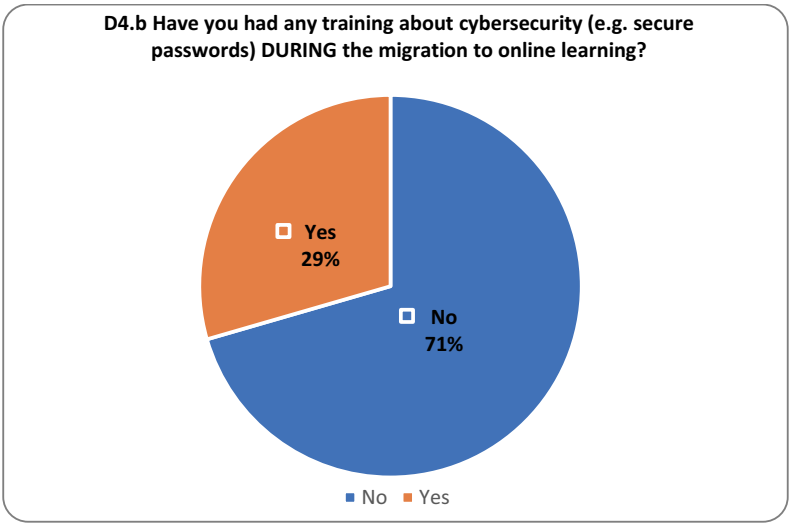

Figure 28 (b): Training about cybersecurity during the migration to online learning

As in the previous questions 62% (before the migration) and 71% (after the migration) had no training about cybersecurity (figure 28 (a) and (b)).

It is evident that the students seem not to have experienced any problems caused by cybercriminals before or during the migration to online learning (figure 29 (a), (b)).

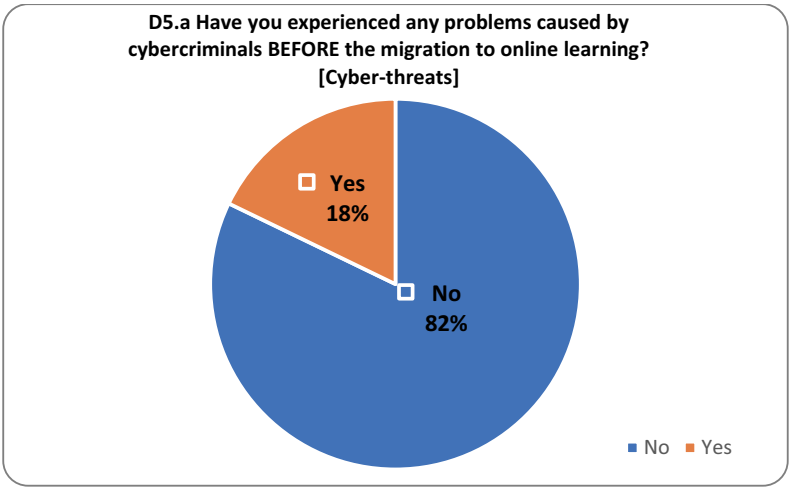

Figure 29 (a): Experiences of problems (cyber-threats) caused by cybercriminals before the migration to online learning

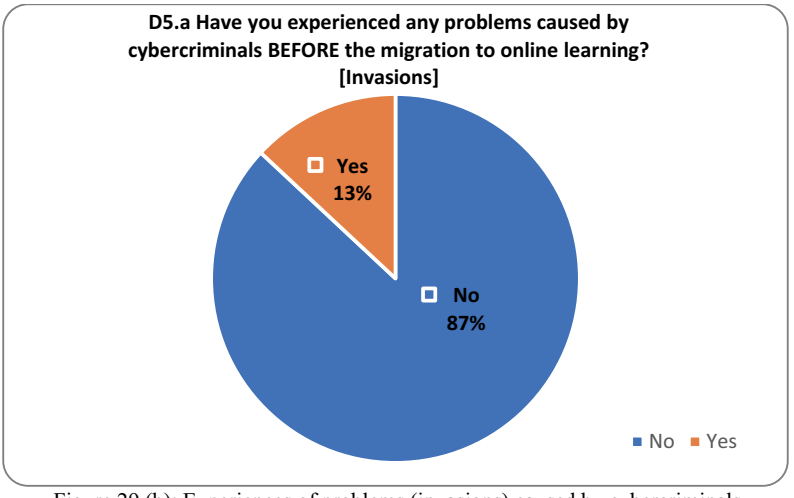

Figure 29 (b): Experiences of problems (invasions) caused by cybercriminals before the migration to online learning

Only a few of the participants had experienced cyber-attacks or their consequences before the migration to online learning, such as cyber threats (17.83%), invasions (13.04%), unwanted adverts (41.43%), phishing (28.59%), and identity theft (13.65%). These numbers show how naïve and unaware the students have been about the cyber-attacks and data breaches but also about other vulnerabilities.

Some of the participants experienced cyber-attacks during the migration to online learning, such as invasions (14.34%), unwanted adverts (38.55%), and phishing (25.10%). Some participants know some of their family members (34.27%), fellow students (30.18%), friends (38.65%), and online friends (25.80%) who faced online privacy and security issues.

These percentages are also illustrated in round numbers in the following figures 30-32.

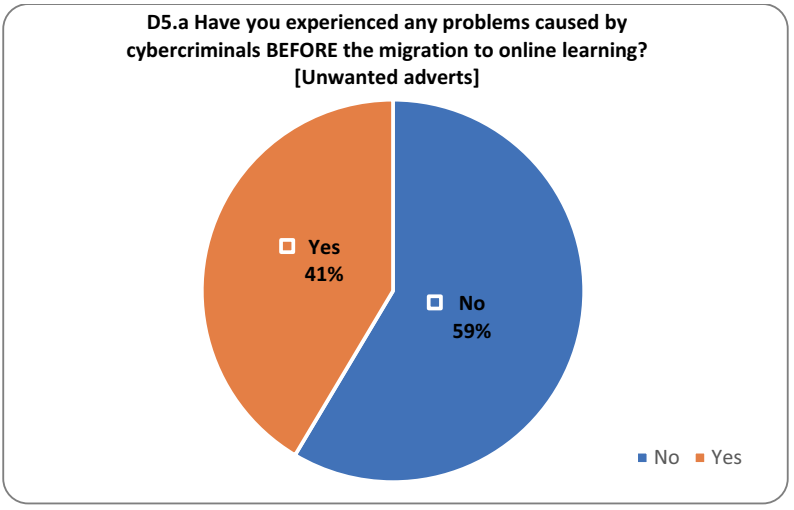

Figure 30 (a): Experiences of problems (unwanted adverts) caused by cybercriminals before the migration to online learning

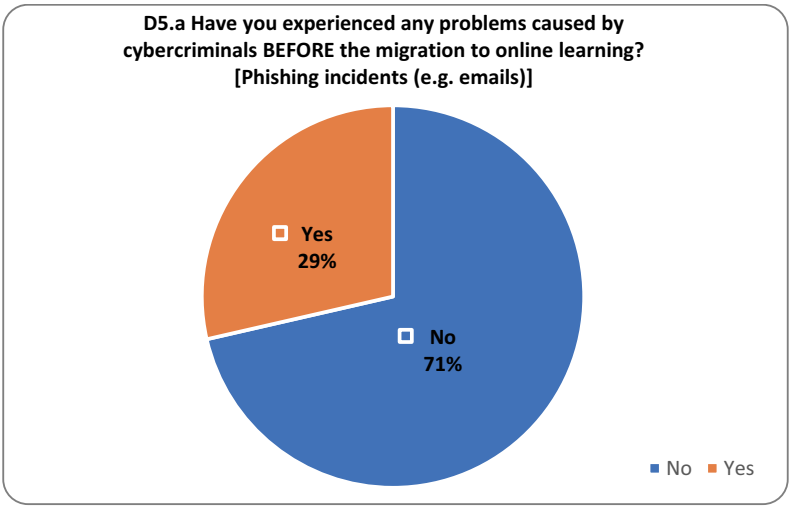

Figure 30 (b): Experiences of problems (phishing incidents) caused by cybercriminals before the migration to online learning

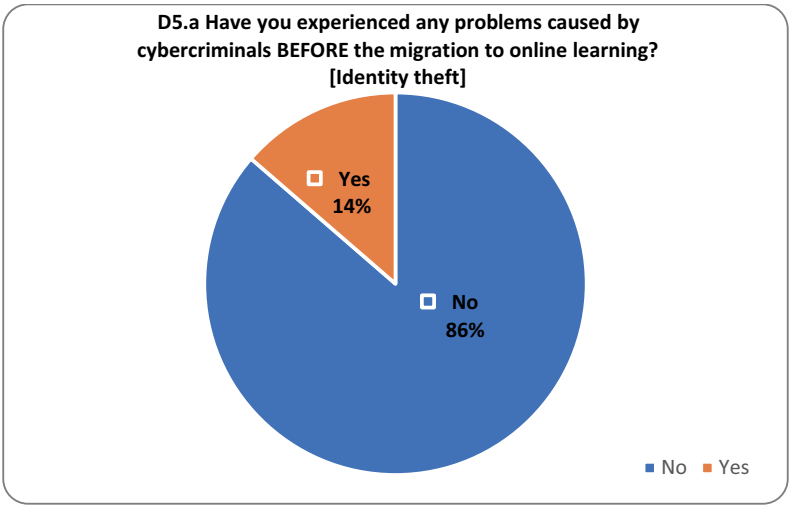

Figure 31 (a): Experiences of problems (identity theft) caused by cybercriminals before the migration to online learning

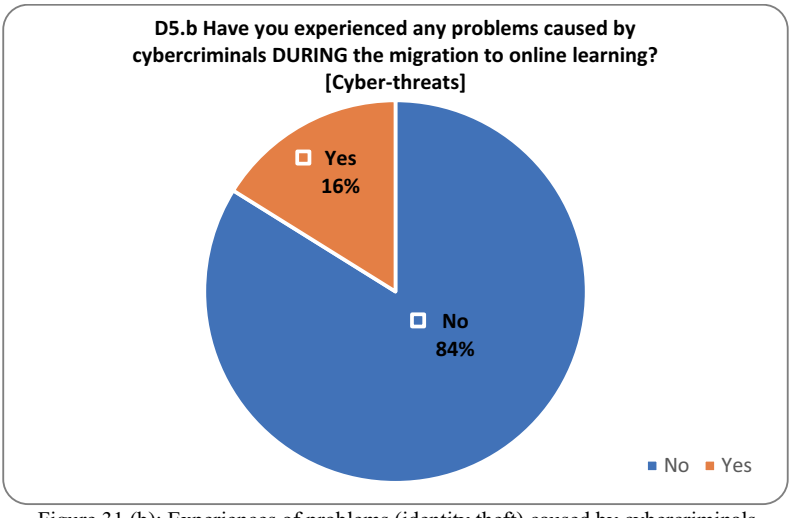

Figure 31 (b): Experiences of problems (identity theft) caused by cybercriminals during the migration to online learning

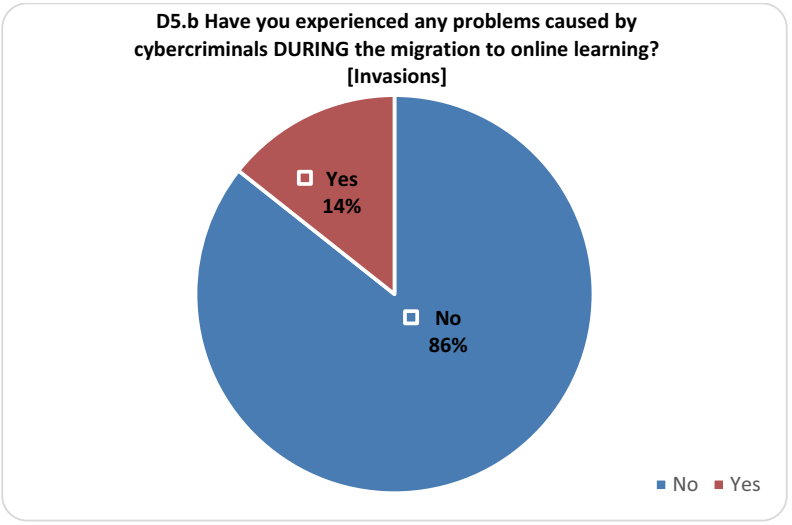

Figure 32: Experienced problems of invasions

The responses here again showed that 86% of the students did not experience any invasions (figure 32).

3.5.3 Potential Measures for Cyber-Protection

In general the survey questions on cybersecurity and online privacy revealed low levels awareness and low levels of training on matters of identity theft, phishing, unwanted adverts, and invasions. Considerable efforts must be devoted on developing and delivering such training in order to address these problems.
Providing training and resources to raise the cybersecurity awareness of the students, teachers, and staff will make them understand the risks and threats they are vulnerable to, how to recognize warning signs of those risks and threats, and ways to stay safe online. It should be reminded to students and staff that the IT staff will never ask for their login credentials via email or threaten to turn off access to their accounts if they do not click on a link. Other actions that will definitely reduce potential cyber risks include, for example, i) implementing two-factor or multi-factor authentication [33] whenever possible to reduce the chance of data breach and ii) providing security guidelines that explain the necessary security measures [34, 35] that students and staff should implement in their personal devices in advance to participate in virtual learning.

3.6 Students' comments, suggestions and questions

At the end of the questionnaire the students were given the opportunity (through an open question) to add anything else they wanted to say. Out of 1005 respondents,

245 students chose to enter additional comments, which included many suggestions for future improvements, as well as some criticisms, mainly around the length of the survey and the complexity of the questions.

In the following sections, we present a sample of the comments and suggestions given by the students, their own words (apart from the removal of some spelling errors) and *shown in italics*. Each individual answer listed below is preceded by a bullet point.

3.6.1 Simple and brief responses

Fifty (50) out of the 245 student provided simple and polite responses such as *"Thank You," "Thank you for this important survey," "Thank you for this interesting and valuable survey"*.
Forty six (46) students (including some that answered in their mother tongue) answered *"No", "No, thanks", "Nothing", "No comment"*.
Others exclaimed : *"Please face to face.", "Reopen universities", or "Keep going forward"*.

3.6.2 Critical Remarks

One student commented:

- *"It is too long a questionnaire, it takes a lot time. We lost interest in the middle of your questionnaire"*.
- *Provide "does not apply" or "I don´t know" options for all questions in the future. You will see some inconsistencies in my answer because the option was not available*

Another student provided an exasperated response in the form of a question *"More?"* Evidently after answering such a long questionnaire, this student was not prepared to answer yet another question!

Three students said that *the questionnaire was too long,* and another said *that some questions were not understandable.*

- *My impression of this survey is that quite a few questions could have been more clear or expressed in a different way for clarity and simplicity.*
- *Some of the questions in this questionnaire were not that clear. Maybe shorter questions one at a time will be best for the user to answer.*
- *I bet with great certainty that I was the only one who took this survey.*

Other criticisms included:

- *I just wanted to say that the last question about cybersecurity (the one where you say whether u trust the internet or media) is a little misleading. Of course, on the internet there is a lot of misinformation, but the amount of information is so huge you can find anything you want with a lot of sources. On the other hand, the media often base their information from one source (not going to say anything about it).*

- *I can see that you have acknowledged that Canada has two official languages in your "Thank you for participating" flag picture, but not Finland.*

3.6.3 Congratulatory/appreciative remarks

- *Very nice work on the questions. I hope you get detailed answers and impact with your results.*
- *Liked the survey. I hope this can improve things, but I feel very pessimistic.*
- *Thanks for the survey*
- *Wish you the best with your research!*

And a rather mysterious response

- *Thank you for all the fish! Unless this student misunderstood the concept of phishing…?*

3.6.4 Complex and elaborate answers

Many students gave extensive and very thoughtful comments, reflections, and suggestions, focusing mainly on the desirability or not of online education. Each individual answer listed below is preceded by a bullet point.
Below are some of their thoughts, feelings and criticisms. On the issue of desirability of online learning there is a wide spectrum from "*Please face to face*" to "*I hope and pray that face-to-face learning will still exist in the future. If it doesn't, human race doesn't deserve to exist".*

The students' responses fell into three main categories: positive, (those that like/prefer/appreciate online learning), negative, (those that dislike online learning, and prefer return to face-to-face), or mixed /hybrid (those that can see both and drawbacks and would thus opt for the hybrid model). In addition, the students provided suggestions for improvement.

3.6.4a Positive: Responses showing clear preference for adopting and continuing with virtual education

- *Proceed to the virtual education system properly and quickly as soon as possible.*
- *Distance learning is very affordable. The student has more free time for self-development.*
- *My engineering school had already implemented a lot of virtual classroom features to are studies and was surprisingly well prepared to go fully online.*
- *I was already studying on a distance course where I only visited the school once for every course to meet the teacher/lecturer. Since I was working full time this was the only way to manage my studies, to do them on distance. The tools in place are good today, but could be further improved to really up the quality.*
- *I think this is the future, but requires quite a lot of technical skills of the*

students and of course the equipment can be expensive and prevent many from being able to participate.

3.6.4b Responses showing clear preference for returning to the traditional method of learning and teaching

- *Face to face classes is the best communication for learning students.*
- *In these tough times it should be taken as a way to help students not an advantage to push us on extra work, assignments, homework ex.. we are all struggling especially students we need to change the way of thinking and the system it becomes a huge psychological problem towards students. Can we stop the online courses plz.*
- *Can we stop the online courses please.*
- *It is impossible to find energy and motivation to study during the pandemic if the situation has decreased your mental health. The fact that you don't have the energy and you get three times more work is a very bad combination. For some people the face-to-face lectures are the only human interaction they have and not having that will compromise their well-being even more.*
- *I am a first year student, and I feel like the pandemic caused my classmates never to get to know each other. We do not have a"bond".*
- *I hope this kind of education (on line) will disappear. Is much better education face to face.*
- *Please think about the students' well-being and mental health. It is very stressful for us to go through this pandemic with all the studying and lectures being online. Of course there needs to be safety precautions but I believe there is a better way to teach during this pandemic. Thanks for the survey!*
- *We want face-to-face learning back*
- *I mostly believe that we should take into consideration that online classes can be improved and replaced by physical ones.*
- *We want our classes .. it's very exhausting to learn everything online ..most of us have vision issues*
- *I hope that the universities open*
- *I think that online lectures are not effective in any way, they are providing superficial knowledge and it's really hard for students to focus on these lectures for so many hours in a week.*
- *Everyone wants to return to the old way of living. I don't know how will this happen but I want so much to go to my university because I haven't yet EVER.*
- *I am in my first year of studies and I don't even know where the entrance is :((*
- *I hope that online method of learning will not become our daily routine from now and then, and we will come back soon to our classrooms, where students interact better each other and where the lecturer can support*

freely her/his opinion without having the fear of being recorded and thus be penalised ted by her/his institution.

- *In my opinion life must not be furthermore filtered from electronic devises*

3.6.4c Responses expressing preference for a mixed/hybrid method of learning and teaching

- *When I started online learning I thought that it is very bad idea but now having experience in it . I found it fine. I hope and pray that face-to-face learning will still exist in the future. If it doesn't, the human race doesn't deserve to exist.*
- *I believe that online learning has its merits, it saved us transportation costs, made our lives easier by not having to wake up an hour or two earlier to attend uni on time, recoded lectures made time management more flexible, and made life generally easier for students overall. However, I still do believe that the core concept of uni, the idea of having a campus and interactions on uni grounds and lecturer halls, is generally needed and should be encouraged. The days on campus form the best days we can have as students at uni due to much needed interaction. I personally support a hybrid system to be used in the future, however not during the time of corona, as it doesn't make much of a difference if we are on campus one day of the week or several. In the end we are interacting with other students making it dangerous and life threatening.*
- *I just wanted to say that the last question about cybersecurity (the one where you say whether u trust the internet or media) is a little misleading. Of course, on the internet there's a lot of misinformation but the amount of information is so huge you can find anything you want with a lot of sources. On the other hand, the media often base their information from one source (not going to say anything*
- *I think the online learning won't be the problem but the situation. If it would be normal, I won't have motivation to study. The only motivating I'm close to graduate and do not believe things get normal during my studies. If I would be freshman I would not study and just wait things to normalize.*
- *I would imagine if the pandemic was not ongoing online courses wouldn't be bad.*
- *Online studies are good to some degree, it gives more freedom. But at the same Online studies are good to some degree, it gives more freedom. But at the same time it is very boring living and studying by yourself in a little apartment. And with time it gives you lack of motivation for studying.*
- *May this pandemic actually bring us a lot more together and provide us with a better way of learning. Anyone who sees this, stay safe and well.*
- *Studying methods should be improved, online education is very powerful, but still students need to have face-to-face interaction with professors*

The last ‘word’ however, belongs to the student who wrote the following extensive, confessional response with his/her feelings and suggestions. He/she took time to write the following:

- *Online lectures because of the pandemic were the only reason I could go back to university after more than 10 years (mostly due to health reasons). While the pandemic has caused me so many practical problems and sadness, the opportunity to go back to university has been a blessing. And while I will be so relieved and happy for myself, for my country and for the world to get over the pandemic, at the same time I feel some sadness that I won't be able to continue my university degree (or my university learning in general, even if I were not able to participate in all the exams I would have to pass to get my Bachelor's) because the lectures will not be taught online anymore.*

  Some of my lecturers seemed to think online lessons are tiring and distracting for the students. My experience as a student during the pandemic was completely opposite to that. I was able to focus on the lecture, because all my physical needs were met. My body was comfortable in the physical environment I had chosen and could improve however I saw fit (and if I were too tired and there wasn't a fit (and if I were too tired and there wasn't a presentation to pay attention to, I could wear my headphones, lie back and focus on my lecturer's voice. If, on the rare case that my health issues made me agitated, I could walk up and down my room wearing my cordless headphones or slightly rock on a rocking chair, which would, again, help me to better focus on the lecture. I was able to eat whenever I needed to and whatever I needed to without any compromise (same with any medication I had to take, and of course the need of toilet use). I had no lost time or lost energy over commuting to my university.

  An exceptional lecturer, while teaching live, also sound recorded the lessons and gave us the opportunity to download them through Moodle (along with the accompanying PowerPoint presentations, which many of the lecturers share anyway, thankfully). What a treat for a student who is not always well enough to watch the live lecture! I felt safe knowing I could still have access to what he taught (even if not live and even if I could not interact along with the rest of the class, which are the ideal) with the rest of the class, which are the ideal) at a later time, when I felt better. It reduced my anxiety so much!!!

  Also, any extra-curricular lectures and symposia suggested by our lecturers were also online due to the pandemic, so access was easy, comfortable, and much less uninviting than going to wherever in the city

you needed to go to attend them and sitting alone or scattered as students. And of course, this way we had access to such things that could be based anywhere in the country and even the world!) The building where my school is housed has always made me feel depressed. It has no personality or warmth and, it is very filthy (at least the latter one being mostly the students' fault, unfortunately). (As far as functionality goes, the elevators do not meet the needs of so many students and though I haven't visited them for a long time, I imagine the toilets are still as vandalised and unequipped as I remember them.

I loved my subject of study and courses much more now that I could detached them a bit from that building and from experiencing its "cold" unfriendly atmosphere) and its somewhat lack of functionality). (They only parts are the libraries, which are "warm" and relatively sunny. But I'd still prefer to mostly study at home, due to my health issues and possibly physically restless nature).

Though I am not an introvert for the most part, it has been difficult for me to find friends at university. That was mostly because at first I hung out with the wrong group of people for me (and then was hard meeting new ones once the groups were formed), but after that it was also difficult because I wanted to choose my classes according to what interested me the most and not on whether or not I had friends who chose the same classes, like many did.

Also, I find it hard to concentrate during the lecture if I try to socialise at the same time. And lastly, because now I am much older than most students, it would be hard to find friends among them for that reason as well. These issues were less prominent during the online lectures of the pandemic.

Though I did not find how to interact with my fellow students outside the lessons (I think Moodle supports it, but I didn't see anyone use that. They probably have Facebook -and communicated unofficially through that- and I do not.), through Zoom/Skype for Business chat I was able to communicate with them when I felt it would not distract me (and it distracted me much less than during the physical lessons anyway). So, I felt much closer to them, despite the age difference. Usually during the physical lectures, if it was a big amphitheatre, I would sit alone and there would be available seats all around me (as for anyone who went alone), if it was a small classroom, we could even be crammed, but it would still not guarantee my interaction with the people next to me.

Also, through the chat function of these two teaching interfaces (Zoom and Skype for Business), we could ask minor questions that the lecturer (if they have chosen to read the chat or are comfortable handling it while teaching)

will address only if they saw a point in it (so more questions being asked and answered) or if we missed something from the lecture, we could ask on the chat and, whoever of our fellow students from the whole class was available -so this was not limited to the ones sitting next to us in a physical class- and knew the answer, would sooner or later reply (as the question would remain on the chat, versus a spoken question), thus helping each other without interrupting the lesson or disturbing the lecturer. (And of course, there's the obvious benefit or sharing links on the spot, whether from/to the lecturer or from/to a fellow student).

In my school there is no student lounge, only a small basement cafeteria and a wide foyer which is unfortunately occupied by representatives of student parties. So, no welcoming place left for socialising anyway.

I'd like to add the fact that if there's a huge audience, during the online lectures. I can still see the lecturer's face and the presentation up close, while in a big amphitheatre that is not possible. So, overall, a much less lonely and impersonal experience, and a much more functional and engaging one, for me.

Note: Where my responses in the survey seem incongruent with the fact that I did not attend university right before the pandemic, it is because I have responded according to my experience of regularly attending my school (which was around 2004-2005). The responses that would be according to my absence, are easily deduced knowing this fact (the absence was total, except for keeping my status as a student at the school active, which only required communication or visit with my school's secretariat and my university's online services).

As can be seen the responses showed a preference to returning to the traditional face-to-face or adopt a hybrid model. A typical thumbs up is expressed by responses like "keep going forward" whilst a typical thumbs down is "face-to-face please". The mixed or hybrid approach received considerable support as well as suggestions for improvement as the following student response elaborates:

"I believe that online learning has its merits, it saved us transportation costs, made our lives easier by not having to wake up an hour or two earlier to attend uni on time, recoded lectures made time management more flexible, and made life generally easier for students overall. However, I still do believe that the core concept of uni, the idea of having a campus and interactions on uni grounds and lecturer halls, is generally needed and should be encouraged. The days on campus form the best days we can have as students at uni due to much needed interaction. I personally support a hybrid system to be used in the future, however not during the time of corona, as it doesn't make much of a difference if we are on campus one day of the

week or several. In the end we are interacting with other students making it dangerous and life threatening."

3.6.5 Main suggestions for future improvements by the students

- *Mental health factors should be more in focus rather than the technology and the different program solutions.*
- *I would kindly recommend institutions/universities to run mixed method (online and face to face teaching). Good luck with your research!*
- *I want to tell all the lecturers that knowledge is more important than teaching the course of study for students just to pass in the exam, no we really need real knowledge that helps us in our life and our work.er, students knew definitely which mode of study they prefer. Moreover, recording lectures prove useful to students that work (and can't attend live classes) and student's that want to revise. Wish you the best with your research!*
- *Platforms that are safe should be used more (If I am not mistaken Zoom has some bad history and as we were doing lectures everyone could access before they changed it to private e-classes after a whole semester.*
- *Tutors should make a Twitch channel so the students can support them with donations and subs.*
- *The EU needs to hurry up with the vaccination process so that I can go back to my life and continue my studies normally and how they were designed to be taught*
- *The books in the library should all be online*
- *I hope this pandemic teach people how much we need each other.*

4.0 Educators' Reflections

4.1 On teaching and learning under corona virus conditions

In addition to collecting responses from students, the authors of this paper (as educators and some as educators and PhD students themselves, or as parents of students) present brief reflections on the impact of the pandemic on the learning and well-being of the students. Although reflections are personal and largely subjective each author decided to concentrate on some or all of the themes listed below depending on their viewpoints, strength of feeling, experiences and the general situation in their institutions and their respective countries:

(a) your own perception of what your students felt like during migration to the virtual mode of education;
(b) how was their learning affected;
(c) how their psychology was affected;
(d) did they have adequate technologies;
(e) how do you think your students managed any of the laboratory work from a distance.
(f) what are the general government/education department policies that either facilitated or hindered the education process?

The idea was to attempt at finding common perceptions and practices in an attempt to gain a general understating, and to identify lessons learned.

4.2 Armenia

Digitalization has been a priority for education in Armenia. Since 2009 a few projects have been implemented in Higher Educationin digitalization, administering Higher Educationinstitutions, and integrating digital skills into teaching and learning activities.

The Government of Armenia initiated several activities to ensure online courses and distance learning for higher and postgraduate professional education. Afterward, the World Bank financed a project in Armenia to develop a web-based "Education Management Information System" and to monitor and improve education institutions' operations in Armenia [36].

In the following years, the government strategy was directed towards developing an online learning culture in the education field. Legislative regulations were drafted to improve this area.

As the situation became crucial with the COVID-19 crisis, educational institutions in Armenia, by the government decision, were transferred to remote delivery of education to ensure the continuity of studies.

This order clashed with the tangible realities of day-to-day work in educational institutions.

Despite insufficient capacity, universities and the Government directed their efforts to find various solutions to get through the situation. The resolutions introduced by schools and universities are:

- Application of a mixture of online, remote, distance, and digital learning modes.
- Usage of such digital tools and platforms as Zoom, Moodle, Blackboard, Google Classroom, Google Hangouts, and WhatsApp.
- Integration of materials from MOOCs via Coursera.

The National Center for Educational Technologies has managed to launch: Education Management information system, online repository of educational materials, online educational platform, online elementary school application system, interactive STEM learning platform [37].

After evaluating the results of numerous studies, the Armenian state pedagogical university administration decided to implement Google Classroom as an e-platform for learning and teaching, which was introduced to students and academic staff.

Armenian State Pedagogy University (ASPU) moved into the online delivery platforms quite smoothly. This is due to the cooperation and contract with Google, initiated four years ago, when the university did a lot of work on localizing the system, as well as training the faculty and students. Four years of experience enabled

the university to suggest appropriate technical solutions and effectively organize online training for schools' teachers [38].

ASPU and Central Bank of Armenia worked closely with the Ministry of Education, Science, Culture, and Sports of Armenia, organizing the "Financial Education at School" sessions for training the teachers. Under this program, "the financial competencies matrix for schoolchildren" was designed by the education experts to integrate financial education in schools [39, 40].

Before the pandemic, in 2019, the teachers participated in a face-to-face training course at the ASPU

and at the regional centers. In total, 2419 teachers from 339 schools had been trained. During the pandemic in 2020, the ASPU Information Technology Center has developed a website for providing online training with the implementation of the Google Meet tool. The tool allowed to continue the training program and to train additional 2050 teachers from 336 schools.

The training sessions were recorded for further review and analysis. Besides, this training of teachers' program allowed get feedback from the education experts immediately/live, which facilitated the incorporation of the feedback and constant improvement of the activity.

It was significant that the developed website was used not only for delivering online sessions but also became a HUB and a depository for training materials for teachers, including manuals, methodological guidelines, and an e-Toolkit for Teachers.

Building an online learning course requires some knowledge that will allow the instructor to create interactive lessons that meet modern requirements. The other problem is related to high-speed internet access, as not all regions of Armenia have a high-quality internet connection. Few technical difficulties arose among the teachers of several rural schools; however, we overcame the technical problems with the help of proper instructions. The Government also needs to agree with Internet providers for the free access in rural areas during the shutdown.

It was noticeable the positive predisposition of the teachers and enthusiasm throughout the entire training, their readiness to gain additional knowledge about dealing with financial matters/ financial proficiency. During the presentation, the trainers organized well-thought-out methods to ensure participants' active engagement and contributions to discussions. It helped to create a comprehensive environment which is an essential approach for distance learning.

In general, digital solutions are supporting professional and academic staff, as well as students, to re-frame learning and collaboration. We can state that despite the uncertainty and pressure caused by the COVID-19 pandemic, the cooperation and flexibility of universities and schools created solutions to address the challenge. The pandemic also posed a necessity to review the technology and internal competencies for digitized delivery of the teaching and upgrade the systems and knowledge to develop an online learning culture.

4.3 Bangladesh

In Bangladesh, the first Covid-19 patients were tracked on March 8 in Dhaka. Thus, the Government of Bangladesh (GOB) instructed to close all educational institutions due to the coronavirus outbreak from 17 March 2020. We are realising that the pandemic has no doubt caused massive problems in Higher Education. However, COVID-19 taught us how to become 'tech savvy'. Universities around the world have been facing lockdown challenges in engaging students in order to enhance academic success. Universities have developed diversified online services during the coronavirus pandemic situation. Likewise, other universities, East West University (EWU) started to convert face-to-face university courses online. With the help of digital technologies, online teaching and learning have been designing and organising so that students can continue to pursue their academic journey at this crisis moment.

East West University has been conducting online classes since April 2020. The following platforms are used for running online classes:

- Google Classroom as an overall Learning Management System;
- Google Meet for live video class/meeting with the students;
- Google Jamboard as a digital whiteboard tool when required.

Also, Google Calendar is used to schedule online classes to avoid any potential conflict of schedules for students.

Opportunities in online education:

- Becoming tech-savvy person,
- Affordable internet packages,
- Created a strong bond between students and teachers,

- Provide a flexible and all-inclusive opportunity with additional guidance and tutoring support from the instructors,
- Library conducts online information literacy class and introducing more online services,
- Provide financial support.

Challenges faced by learners in participating in online education during COVID-19:

- Ever widening Digital Divide because of which students from underprivileged families cannot join online classes,
- Because of closure of libraries and limited support, students cannot receive help from librarians or use library collections effectively,
- Complex systems (poor user interface, hard-to-understand software) which hamper smooth participation in academic activities by students,
- Poor infrastructural facilities, weak network, power disruption etc. preventing students from being connected to academic activities,
- Lack of free content, preventing majority of students from developing countries to join online classes,
- Poverty, lack of awareness and a negative mind-set – hampering the successful implementation of academic activities during Covid-19 pandemic,
- Because of cognitive differences, all students will not be able to reap the full benefit of online education.

Challenges faced by teachers in online education during COVID-19

- Organisation of work processes,
- Time management,
- Technophobia,

- Lack of trainings about how to operate contemporary technologies,
- Old-fashioned,
- Fear of accepting new things,
- Collaboration and Networking.

Using Kahoot; a free game-based learning platform

In the online pedagogy environment, pedagogues can choose various online games techniques based on the subjects as well as educational content. A well-known example of a live edtech game is Kahoot. It is a free game-based learning platform, used as educational technology in schools and other educational institutions. The department of Information Studies and Library Management, East West University has been using Kahoot since 2016. In this pandemic situation, this game-based learning platform helped us to engage students and boost their academic success. In order to alleviate the stress level of students during online exam, we found it very useful.

The University Grants Commission (UGC) of Bangladesh plans to launch a blended learning policy. The policy will be made to coordinate onsite and online education, so that universities can continue academic programmes and courses in a post Covid-19 era. It has been observed that blended learning is the need and demand of today and tomorrow. Educators should develop diversified skills to adopt contemporary technologies pertinent to blended learning.

4.4 Bosnia-Herzegovina

This observation was made upon the data collected from the University of Bihac and Slobomir P University, both from Bosnia and Herzegovina. The data collected from both universities in B&H although being far away from each other shown that there were no significant differences between the students' opinions and answers related to the unexpected transfer from face to face to online teaching mode. All of them highlighted the similar concerns, suggestions and preferred approaches to the online teaching mode. They all emphasized the same obstacles caused by virtual learning and recommended the necessary improvements in the future.

Unlike some other universities that used to have face to face teaching process only, the universities in B&H had a significant number of guest professors lecturing mainly online even prior the pandemics. Due to that fact the students were familiar with the online education approach and the transfer to virtual mode of education did not present an enormous difficulty for them. The online communication among the students and with the lecturers although maintained on a regular basis reduced the socialising and interaction effect. The attention of students at the beginning of the virtual teaching mode was on a high level but during the time and due the overall locked down situation became gradually decreased. Students' learning attitudes towards their homework assignments although they had more free time during the lockdown were not increased but rather lowered. The pandemics also stopped the well-developed students' international mobility. The interest of students enrolling in the last academic year although affected by pandemics remained the same as before.

Based on the data feedback collected from the students after they have evaluated the teaching process and teachers through the forms made on a regular basis it was noticed that they emphasized the difference in achievements of curricula between theoretical and practical subjects. Any practical work that required usually personal approach was done in an insufficiently well manner. Because of university library not having online access the students were encouraged to more individual way of data collecting from different sources as social media, online conferences and similar. Most of students and professors, while being on isolation caused by COVID-19, unless when suffering heavily from more severe symptoms attended and carried the online teaching process.

Based on the data collected from the questionnaire sent to the students as a method of this paper scientific research a SWOT analyses was done in order to complete the students' overall views related to teaching process during the pandemics. The analysed results proved that most of the students pointed out the same obstacles in the imposed online teaching mode.

Table 1 SWOT analysis on views of universities' students from Bosnia and Herzegovina

Strengths	**Weaknesses**
1 Internet access before pandemics 2 IC equipment in personal possession 3 Higher level of interaction	1 Sharing IC equipment with family members 2 Technical support during pandemics 3 Prior knowledge of often used platforms 4 Laboratory work during pandemics
Opportunities	**Threats**
1 Possibility of using more platforms 2 Assessments during pandemics 3 Students ideas for improvements of platforms and better teaching methods	1 Learning outcomes during pandemics 2 Subjects from Science affected by online teaching 3 Students' lower success at exams 4 Cyber-crime, privacy and security concerns

Most of the differences in students' answers were related to their affiliations, especially the obstacles in the subjects and laboratory/practical works from the Science courses.

The SWOT analyses on views of universities' students from B&H highlighted some of the most appreciated advantages like: Internet access before pandemics, IC equipment in personal possession and a higher level of interaction. It was pointed out as a strength that assisted students when unexpected transfer from offline to online teaching modes occurred. Although more than 97% of the students answered that they had Internet access before pandemics had started, only 78% of them had possibilities to use IC equipment in personal possession.

The main obstacles brought up through the survey were: sharing IC equipment with family members, technical support during pandemics, prior knowledge of often used platforms and laboratory work during pandemics. All of the students stated that they did not get any technical support and apart of commonly used platforms before the pandemics such as ZOOM and Viber 98% of them emphasized that they did not have any knowledge of other platforms that could be used. More than 60% of students stated that they felt a loss in laboratory and practical works during the online teaching.

Opportunities, as can be observed in the table above, were emphasized in possibility of using more platforms, assessments during pandemics and students' ideas for improvements of platforms and better teaching methods. Although there are lots of teaching platforms, only three of them were commonly used during the pandemics at the universities of B&H: Google Classroom, ZOOM and Viber and that is something where students want to have an improvement to be done, seeking for more communication platforms and the way of how they have been taught. As pointed out in students' opinions a higher reliability in assessment has to be achieved also.

The threats that students found can be considered in the following: learning outcomes during pandemics, subjects from Science affected by online teaching, students' lower success at exams as well as Cyber-crime, privacy and security concerns. Most of them stated that studying during the pandemics and consequently learning activities were not done in a serious way as it used to be when offline. Almost 75% of them believe that lecturing in Science lost more than in Social studies what influenced to lower marks in exams. However, the most significant thing highlighted by the students was the fact that almost 90% of them did not have any training on Cyber-crime, privacy and security before or even during the pandemic.

Moreover, the overall situation in Bosnia and Herzegovina as a jobless state with not well defined political and social security and daily bad political decisions brought up by the lawmakers also affected not only the students' knowledge acquiring but their mood in general. Apart of the challenge that online teaching mode caused and new overall life style the students' psychology suffered from worrying for the family members especially older affected by the lack of many required items such as protection masks, gloves, immunity medicines and other. However, some of them

managed to contribute to the society by making safety face-shields on 3D printing, preparation of disinfection liquids, psycho social support to the people in need, cotton masks manufacturing and assistance in teaching Bosnian and English to the minors' immigrants from all over the world passing by the area on the way to other European countries [40]

The students have been well information literate that helped them a lot in using technology in teaching process based on various online platforms. The complete technology they used was their ownership and unfortunately neither any authority nor institution provided or rented them any phones, laptops or similar. Socio-cultural differences were also noticed and they were caused by low level of parents' incomes, if any, and overall economic situation in the country. That is why the equipment like phones or PCs had to be shared often with the other family members or between the students themselves. At the end of the summer semester and prior to the final examination the university Senate made an initiative based on the better overall epidemiological situation to carry on all laboratory and practical works as well as exams in smaller groups in alive. One of the previous papers showed that "*In order to reduce differences in equity of approach we managed to change and update the HE law at the level of the Una-Sana county. In that way the legal basis to perform the whole education process online was created. Not only the education process but the assessment also and exams have been performed online also. Evaluation of the students' knowledge was conducted through the university info students' service and web conferencing applications*." [2] Comparing the results obtained from the questionnaire sent to the students with the previous research covering the universities' staff opinions, it was proved that the students and professors have highlighted the similar views from both perspectives. Overall online teaching process cannot implement the Bologna process in a proper way due to many areas that were partially or even not at all done such as fair assessments, consultations, interactions, mobility of students and academic staff.

In general, the challenges caused by the COVID-19 may be overcome by strengthening the university infrastructure, increased availability of technical equipment if needed, additional training of teaching staff in creation of online learning materials and especially more active international collaboration in distance research methods. It can nevertheless be concluded that even pandemics caused difficulties in the worldwide education process imposed new teaching approaches there are still lots of possibilities for improvement and further scientific research. Although lots of research and surveys have been made on national levels the results remain unknown to the wider audience there is a necessity of creating a co-operation, experts' network and exchange of experiences such as this international study did in order to point out the opinions from all over the world.

4.5 China

In January 2020, the COVID-19 suddenly broke out in China, when all Chinese people were in the preparation for the Chinese Spring Festival, and the long national holiday. At the end of January, universities started the winter vacation; all students had gone back to their hometown.
During the whole of February and March 2020, Wuhan was completely locked down. No public or private transportation was allowed in or out Wuhan. In some areas in Wuhan, people were not allowed to go outside of their home. While in other cities in China, there was no official lockdown, restaurant, shops, cinemas and many other businesses remained closed. Companies and government started working at home policy. Even though the public transportation in China still operated normally, but few people went out for business or recreational travel. For university, the winter vacation lasted for one month in February. The new semester started at the beginning of March. All schools remained closed since the end of January.

On April 8th, Wuhan officially lifted its lockdown. From then on, work and life in all Chinese cities were gradually returning to normal with very tight pandemic control measures, like testing, quarantine and tracing. But all schools including primary and secondary schools, colleges and universities were still closed till the summer, due to the high risk of gathering in face-to-face classes. In universities, the new spring semester started as planed in March, we carried out the online courses for the whole spring semester till end of July.

We got the notification in February during the winter vacation that in the spring semester all courses would be taught online. We had very short time to prepare the transition. It was a huge challenge and pressure to academics, technical staff and administration authority in the university. It was decided by the university authority that all courses should be delivered as planned. We had to give live lectures online at the same time as planned.

During the pandemic, most universities were open to faculty members from March to July, Students were not allowed to enter to campus. We could work in university to give online lectures to students. At that time, the resources of online teaching mainly included: existing MOOCs courses, teachers self-recorded SPOCs online courses in university. These educational resources had been established mainly for the supplement of classroom teaching, which couldn't fully adapt to requirements of online teaching. At the beginning of the spring semester, we anticipated the main problems might be:

1) Teachers are not familiar with the platform and technology of online teaching;
2) A large amount of course content needs to be quickly converted to online forms;
3) The practical experiments, demonstration, interactive discussion, etc. in the face-to-face teaching is difficult to be implemented in online teaching;

4) Some students live in remote areas, where the network conditions are limited, participating in online learning encountered certain difficulties;
5) Student engagement in learning is affected, because of lack of "collective" learning atmosphere, affecting students' attention to learning and participation;
6) International students take part in online classes with time differences.
7) Assessment of learning is difficult in terms of integrity and fairness.

Measures and actions were taken quickly at national and university level. On February 5, 2020, the Ministry of Education issued the Guidance on the Organisation and Management of Online Education in Higher Education During the Pandemic. This guidance clearly requires that universities should jointly promote and guarantee the online education of colleges and universities during the epidemic. In this process, the government took the leading role, and universities as the main body of implementation, and all sector in the society should participate and offer help to university and students. Each university should make full use of MOOCs and provincial and university-level high-quality online education platforms. Then, many China's Internet companies started to open their products to schools and students freely. Many online MOOCs were open to all students. At university level, measurements were taken urgently to purchase new equipment, upgrade the network and servers, upgrade Moodle system on campus, many technical support documents were provided to students and teachers.

The main online meeting platform been used in China is Tecent Meeting, which is very similar to Zoom. In my lecture, I use Tecent Meeting to give lectures online for 1.5 hours at a time. Slides, materials, and recorded lecture videos were uploaded to the university's Moodle system. It's required by university that we have to provide the videos of lecture to students, in case that the Internet connection is poor for some students, they can watch lectures at a later time. I had to record my lectures in my office. The assignments were given in Moodle, and students submitted homework in Moodle. We also used WeChat, which is a mobile app, to communicate with students for questions and answers.

So, it's been a huge amount of workload for lecturers to transfer the PowerPoint slides into online videos, which is difficult in terms of technical and pedagogical issues, and very time consuming. Some teachers preferred to use more interactive ways of teaching, like chalk and blackboard. T they had to change to another way of teaching. When in the classroom we can give students demonstrations using the real equipment, but online, we had to create animation or record the demonstrations in the lab. For those courses with laboratory work, we adjusted the curriculum, the laboratory work was done in the winter semester. So, we had to update our equipment, such as buying new tablet for using the whiteboard in online lectures.

For students, the challenges were not on "hardware" side, but more on "software". For Chinese college students, most of them are very familiar using Apps in Internet, students either have a strong knowledge and skills to use a variety of online teaching and learning platform, or can learn it very quickly, as well as a variety of online

learning tools. Laptops, Pads, and cell phones are very common for most students. In the 33 responses to the survey, all students had the broadband Internet connection at home. Of 33 students, there were only two students upgraded equipment form cell phone to new tablet or laptop, which were supported by their family. University also gave lots of supports for students in using online platforms. In my teaching, I didn't receive any complains on Internet connection, online meeting system, or Moodle.

On the other hand, even if most of students could move freely in their home city, since there was no lockdown in most cities in China, studying without partners still brought some psychological problems, such as time management, learning attitude, concentration, and engagement in studying.

From my own teaching experience, and the feedbacks of survey, half of the students said they spent 50% more time in studying in online courses. The other half said they spend about 25%-50% less time in learning. About 21% admitted that their ability to complete homework assignment was affected from good to bad, and only 6% said their learning attitude and concentration changed from positive to negative. Even though we can find that subjectively students are willing to take online courses as seriously as before, their performance during pandemic were affected. From the survey, 36.4% of students' overall grades were lower than previous years, which resulted partially from students' emotional status, poor communication between students and lectures, and among students themselves, and also imitation of online lecturing on engineering subjects. The other reasons might be the assessment methods, the reliability of online assessment is still a question.

According to the national statistics, as of April 3, 2020, 1,454 colleges and universities nationwide have opened online out of a total of 2,688 colleges and universities in China, accounting for 54.09 % of the total, and more than 950,000 teachers have opened 942,000 online courses, with a cumulative total of 1.18 billion students taking online courses.

Starting in the fall of 2020, all universities in China, as well as all primary and secondary schools have gradually resumed normal face to face teaching. But having the six-month of online teaching, it has been realised that online education became another opportunity to establish a better Higher Education system in China for teachers and students. The online teaching can be used as a useful complement to traditional offline education. The hybrid online and offline education model will be a new trend in China's university education system for a long time. It will also be the trend of Higher Education in the world in the future.

We have found the following advantages of online and offline hybrid modes of education:

1) Online education promotes innovation in university education;
2) Online education strengthens the exchange of teaching experiences, and the sharing of excellent courses;
3) The teaching process is more rigorous and standardised;

4) Students can have more flexibility to arrange their own study time;
5) Improvement of the effectiveness and utilisation rate of classroom teaching;
6) Improvement the motivation of students to learn independently;
7) Various forms of online education can attract students' interest in learning.
8) Provides students with multi-dimensional, multi-level, diversified development space.

Now, many universities are continuously promoting the online courses. The important purpose of implementing online courses and other forms of online education in China's Higher Education is to share educational resources and give students more space to acquire resources and knowledge. Globalisation and informatisation have always been the main driving forces for the reform of Higher Education in China. Implementing online education can also improve the internationalisation of education, attracting students from different countries around the world.

Finally, we are glad that we can come back to classroom to meet our students. The experience of teaching in classroom is not replaceable. We can also see from survey, more than 90% of students think face-to-face teaching will not disappear in the next 10-20 years. For them, the college life, and friendships are always the most precious in their whole life.

4.6 Cyprus

Corona virus took us by surprise. Before the pandemic nothing predisposed us to how our life was to be changed. We have changed our everyday life activities, our communication with our friends and relatives, and more importantly, we have changed our priorities. We now give more emphasis to “smaller things” that before we were not paying so much attention, such as a hag from our loved ones.

The virus had a great impact on our work as well, and as academics we never expected to transform our teaching style from in-class lecturing to online lecturing at such a speed. Of course, using online platforms was nothing new; we were using them for some years either as supporting tools or for online courses. However, in our university most of the courses were delivered in class. Thus, most of our teaching involved delivering the lecture using PowerPoint presentations, but were considered appropriate, especially in presenting examples or solving exercises, this was done on the whiteboard, allowing students to take part in the solution of problems.

And then it suddenly happened; all the teaching was delivered online. At first, we tried not to change our style of teaching, illustrating examples by drawing diagrams on whiteboard offered by online platforms or by using the “pen” of PowerPoint. It proved to be quite a mess.

So, we added animation in our PowerPoint presentations and implemented application programs to illustrate a number of course concepts. Two examples are

given below. Figure 33 presents a program that solves the "Towers of Hanoi" problem, which was implemented in order to teach students the concept of recursion in a Data Structures course. Figure 34 presents an application developed to explain Geometric Modeling algorithms in a Computer Graphics course.

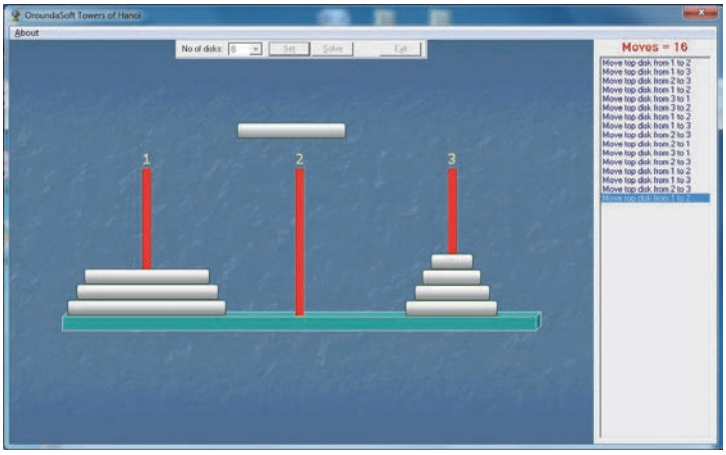

Figure 33: A software application that solves "Towers of Hanoi"

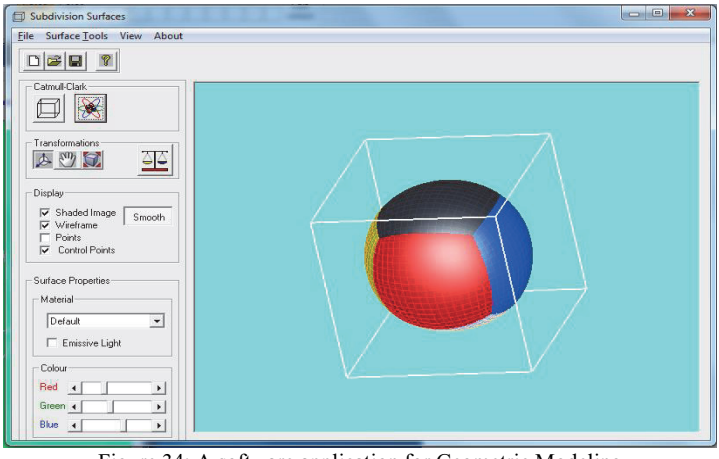

Figure 34: A software application for Geometric Modeling

We also sought ways to involve the students more into the learning process. Ways that would promote student interactivity with each other and with the lecturer, promote group work during class time and outside that, and overall strived to make our courses more interesting to our students. As a result, our course content was enriched with a lot of new activities such as video presentations, demonstrations of problem solutions, class debates and discussions and other. During the class, students were often put into groups and worked in breakout sessions on different

tasks. They then returned to the class to report on the results of their activity. Online forums were utilized for discussions on a variety of topics, and project requirements often included a video demonstration. We also placed a lot of emphasis to our communication with students; we requested that they made intermediate submissions of project work and tried to give them prompt and helpful feedback throughout the course. Receiving feedback from them was also valuable to us and we tried to get that from our students at several occasions.

According to feedback we got out from our students, the pandemic outbreak at first did not really catch their attention. They felt that all this was far away and would not affect them. Suddenly, after the lockdown they were overwhelmed with all the changes that were happening. A late night in March they were notified that the University would be closed until a later date and classes would continue to run online.

We started online classes on the upcoming days, and they did not complain. They were happy to continue their studies and not left behind, but many stated that it was not the same not being able to be in the class with their friends physically. Some expressed that they thought taking courses online would be difficult, however, they enjoyed it.

Now, after more than a year several of students expressed their wish to be back to classes and of course to be able to go out and enjoy their student life. A student also stated that if this situation continues, he would rather drop out of the university and seek for a job because he cannot stand being at home all day long.

Concluding, the last year has affected everybody's life in a strange way, in a way that we could never imagine. The good news is that we all spend more time with our families. It was nice to have everyone gathering around the table again with only each other to talk to.

Unfortunately, however a number of people lost their jobs, do not have money for them and their families, and even worst, some people lost their lives due to the virus.

We feel lucky that we and our loved ones are safe and healthy, and we are able to continue passing knowledge to our students in any way available.

4.7 Egypt

The transition to virtual learning affects not only students but also their parents. The entire online learning process is new to both university professors and their students, creating a great deal of uncertainty. During the current crisis, the entire faculty worked tirelessly to improve digital literacy for all students and faculty members.

Some faculty members lack digital skills, while others dislike using it. Additionally, some teach subjects such as theatre for example, which are difficult to teach with technology. Some people were overwhelmed by the paradigm shift, whereas others, who are generally comfortable with technology, have tried blended learning, and do a lot of online things for their classes anyway.

Age is thought to be a determining factor in acquiring digital skills. Although the younger you are, the more likely you are to be comfortable with technology, and there are many older faculty members who are comfortable with technology while students struggle with it.

Professors were trained on tools purchased and supported by the institution, but they were also given guidelines on how to use other tools. It is crucial that in times of crisis, if someone is already familiar with something, they be allowed to use it. Though in many institutions, they request one way and do not accept any other even though, the laptops' hardware may not support it.

Personal skills are also important in online teaching success. Some people are generally better teachers than others in their subject, and it also depends on how much time people are willing to devote helping hands to their students.

Another important consideration is the availability of high-speed Internet access. Some people have expensive Internet, but it has limited capacity, and with everyone staying at home and working online, Internet packages frequently run out. In the midst of all of this, professors should simply do their best with the resources available to them and their students.

The corona virus outbreak has caused everyone to reconsider online learning. Previously, online teaching was thought to be something that would happen in the future, but it was thought to happen to some people but not others, and it might be impossible to do for certain things. Everyone can now try to imagine how everything worked all over the world.

In the current situation, all of the good practices related to online learning are not necessarily occurring, nor should it be expected to occur, nor should pressure be put on people to make them occur. Because there is so much anxiety and stress in this situation, the most important thing is to learn to be kind to one another and to ourselves.

If online learning is to be expanded in the future, the technology infrastructure will need to be improved, although it has held up quite well so far. Also, professors should be taught digital literacy so that they are not forced to use the same tool if they are not comfortable with it.

Another critical issue is to reconsider curriculum content and make it more adaptable. It is vital to understand what is essential, important, and relevant. Another crucial aspect was rethinking assessment. The Ministry of Education at the

beginning of the Corona crisis required students to hand in projects instead of sitting for exams. However, one of the most difficult questions is how to do something other than an exam and ensure that everyone is doing their work without cheating or paying someone to do it for them. In the midst of all of this, one must consider equity.

One of the efforts that has been helpful in this regard is the Egyptian Knowledge Bank, which is a well-thought-out project with a large amount of educational material that is available to everyone equitably. Hopefully, the world will make resources available for free to everyone. During the crisis, many libraries made their content available for free, but these were only temporary solutions. It is critical to ensure that people, including those with special needs, have access to the resources they require.

Another issue is that the combination of working from home, Internet bandwidth, supervising children, and house responsibilities is very complicated and tiring that feels like education should not take up the rest of people's free time.

It has also been observed that parents are having fights with their children in order to get them to work; they do not understand that it is too much for them. They are overly stressed as a result of what is going on. In fact, there is a lot to be concerned about that teaching should not be added to the list. Everyone on the planet has a unique educational experience. Some people may be able to manage, and others may not. Nobody has chosen to be in this situation, and accordingly nobody should be punished for it.

Last but not least, one thing has come out of this situation; students are eager to return back to the University's campus. They now recognise the value of university experience, which is truly a win.

4.8 Finland

a) Searching worldwide reported information [23, 41] and scrutinising personal perceptions on what learners (students and teachers) in Finland and worldwide felt can be time-consuming and could probably be very subjective by its very research nature. In general, it seems that the perceptions and experiences of the new learners are like a cold shower to lukewarm water for swimming! That is, the feelings of the learning actors about the learning process and the current results seem to be mixed, ranging from satisfaction to dissatisfaction and the opposite.

There is, however, a variety of non-finalised (ongoing or non-temporal) initiatives taken from many perspectives and ethically and professionally authorised bodies that are currently active. These, presently and continuously, concentrate data collection sources under the circumstances of the new, remote (online or/and offline) mode(s) of education. These projects, along with the present one we are currently involved, might, later on, bring a refinement and clarity on the complexity and perplexity of the up-to-date findings.

Nevertheless, it is worth reporting and reflecting on personal observations and most updated findings on the **points b) – f)** below, because they are mostly of socio-technical and economical nature and originate from a pedagogical and social science perspectives. For example, comparing and contrasting own and other findings, someone can clearly evidence that some of our research study outcomes are common to all the countries throughout the world and some differ significantly from country to country. This diversity and differentiation are also true among similar administrative regions and even within the European Union, where there have been years of strategic decisions supporting integration efforts for digital divide disappearance and equal opportunities policies. In particular, notable differences and disperse issues can be seen among also similar geographical regions of the world and (yet) even within the same country.

b) For instance, we have observed that the financial status and the knowledge of the Finnish and other countries' parents played a major part in the learning of the students during studying from home. Thus, the learning process and its outcomes were directly affected by the unequal opportunities to useful knowledge access in addition to the relative comfort in the means for providing the basics for a common decent life; wherein the general standard of living has been endangered and threatened to deteriorate during COVID-19 [42].

(c) Consequently, the psychology of the learners was reportedly affected because of the variables of change specified earlier but also because of the lack of the physical contact and face to face communication. The certainty of the online interaction and in-house safety did not overcome the feelings of the fear of isolation, nor the insecure emotions regarding the lack of freedom of movement and the sense of timing. Not knowing when the Coronavirus situation ends and not even being able to have a rough estimation on the return to normal (previous) life slowly created a sense of hopelessness and a lack of positive thinking in learning, schooling and life.

(d) There seemed and still seems to be an insurmountable amount of change in learning modes, models and styles with the adoption of adequate communication technologies and learning tools available through private and public, open and closed technology-based platforms. Many private collective initiatives also proceeded in providing their own packages of learning technologies and educational materials online e.g. in the Nordic and Baltic region. However, the digital divide exists in nearby regions and worldwide and there are many cases reported in developing and developed countries where different (than online mode learning) measures and practices [23, 41, 42] had to, unavoidably, take place.

(e) Most of the socio-technical and socio-cultural differences regarding e.g. nationality, social class, social status and economic situation appearing worldwide due to the COVID-19 invasion have been commented and their effects have appeared, some from the first days already. Personally, speaking we believe that two phenomena, though being referred in a limited manner by researchers, have been overshadowed and have rather been under-researched or under-estimated by decision and policy makers in particular.

i) One is the gender discrimination where there is a general agreement on the deterioration of the women's rights due to the different role they were called to play for family and work support abandoning work duties or completely giving up work. Yet, it is still unsure if women were the first to be dismissed by their employers. Nevertheless, worldwide organisations such as OECD refer to the deterioration of women's position in work and society outlining that gender equality has clearly been worsened during COVID-19 era.

ii) The other phenomenon that has been neglected is the cyber-security knowledge and online safety guidelines in virtual presence navigation [43, 44]. There seems to be neither social awareness nor public education awareness on the choice, use and deployment of safe and secure learning environments. Usable security should, on one hand, be the A-Z in online mode of learning for the sake of all parties involved because it shows caring and well-being proactive thinking by the online education/knowledge providers and policy makers for the future citizens. People's safety and (cyber) security should, in general, be part of a strategic welfare programme of the countries. *"Those in the weakest position do not necessarily have the same social networks that create security as those in a better position. That is why we must ensure that public services are also effective in sparsely populated areas, so that no-one's security and well-being is dependent on informal assistance alone,"* [45] says Finnish Minister of Internal Affairs Maria Ohisalo [46].

(f) Certainly, with a lack of suitable technological equipment many (perhaps most of the) students did not manage any laboratory work from distance mode. In fact, no much laboratory work took place in virtual mode and many essential laboratory-based courses in Higher Education were not transferred to virtual mode. In so doing, courses in Medicine and Agriculture, for instance, took place on-campus and not online with students and laboratory instructors meeting face to face; hence, with safety distance but not distant at all!

Further and Other General Remarks during COVID-19 in adult and Higher Education

Further, someone could easily observe and mention general governmental and organisational or departmental policies that either facilitated or hindered the education process nationwide or worldwide. It has been observed that educational equality has not been achieved during COVID-19 even in many advanced technologically countries. It is worth noting, though, that countries with women prime-ministers or central ministers (e.g. in Health, Social/Internal Affairs and Education) performed better in handling the COVID-19 crisis. This can be argued to be a genuine political observation given the fact that the women in the political power span the range of political colours from right to left and they do not exclusively belong to any particular political side.

Sadly, some trade unions in Higher Education report that during COVID-19 there are unusually frequent phenomena of overwork, unpaid overtime and burnouts for their members. Problems also arose with bad management of human resources as well as labour-intensive and unequal or favourable work task distribution. Many

trade unions have had to arrange special training sessions for supporting their members and providing counselling with legal and other advice and coping strategies. Feelings of hopelessness and job dissatisfaction and fatigue deriving from sisypheian work efforts and lack of management's understanding appeared very regularly and many teachers in general decided to leave their jobs and change careers.

Last but not least and irrespective of any political and socio-cultural norms the degrees of readiness and preparedness of every country along with the technological advancements and local initiatives had varied a lot. And these four parameters signified and dignified the level of well-being in virtual Higher Education during COVID-19 crisis from its begin (February-March 2020) until now (April 2021). Yet, there is no way of telling who and which outperformed; it is up to current shaping HE policies and future considerations of the rising knowledge-shaped national economies as components of the recovering from COVID-19 glocalised societies.

4.9 Greece

According to Eshet (2007) [47] 'the Minister of Education gives the impetus for the technological equipment that needs to exist, for the educational staff and their training in Information and Communication Technologies (ICT) and for the cultivation of (a) synchronous survival skills'.

However, teaching in distance mode education has been 'fragmentary, away from interdisciplinary and holistic approaches and far from the digital school logic. In essence, it is found that digital tools are part of the teaching, mainly in the computer science course, with a technology-oriented approach (with negative sign') (Koutsogiannis, 2007b) [48].

Due to the sudden transfer to distance mode education as a result of the COVID19 pandemic was chaotic.

Students in Greece seem to be quite familiar with technology, but use it in their daily practices, such as communication (social networking by Instagram, Facebook, Messenger), entertainment (YouTube), playing digital games (e.g. Roblox). Parents consider this activity to be natural, but not particularly natural in school environment (Koutsogiannis, 2007a; 2011) [49, 50].

The policy makers tried to support distance learning in the light of COVID19 through distance learning by providing synchronous form of learning, with digital libraries and websites (e.g. Photodentro (http://photodentro.edu.gr/lor/) [51], digital school (https://dschool.edu.gr/)[52], digital platform "e-me" (https://auth.e-me.edu.gr/) [53], platform "Aesop" (http://aesop.iep.edu.gr/) [54], video lessons from the state television channel ERT (https://webtv.ert.gr/category/mathainoume-

sto-spiti/) [55]. Teachers were adequately trained to upload material to the platforms and accept the assignments of their students.

The study of the curricula of the Schools of Primary Education in Greece (Tzifopoulos, 2019) [56], counted the courses, either compulsory or optional, which are offered to pre-service teachers. In particular, 7 of the 9 university departments offer from 4 to 10 ICT courses to primary school candidates. In total, of the 84 courses offered, which concern computer and ICT, 12 of them (16.7%) are compulsory and, as can be seen through their contents, the 8 courses combine theoretical orientation knowledge and laboratory issues. 2 are theoretical courses and 1 course has a laboratory character. It is noted that the student, who prepares for teaching in primary school, mainly through free elective courses, has the ability to acquire more specialized knowledge and enhance his/her technical and pedagogical skills with the contribution of digital technology (Programming Languages, WebQuests, Digital Games, Digital Comics, Virtual Learning Environments, Wikis, Blogs, Websites, STEM Applications, Video Editing, Google Apps, etc.).

In the study programmes of the University Schools that prepare tomorrow's preschool teachers in Greece, there are theoretical and practical courses, including a smaller number of courses related to distance education (Tzifopoulos & Bikos, 2016) [57]. In total 44 courses are aimed to Information and Communication Technologies (ICTs), and only one third of them (14 courses) are compulsory. 7 of the compulsory courses (half of them) are Computer Science courses. Three courses have theoretical orientation for technology (theories for educational technology and ICT learning) and four have a laboratory viewpoint, linking theory to practice.

Seferis G. [58] (Greek poet laureate 1963) in his poem "An Old Man On The River Bank" wonders and suggests….

> We *the patient dough of a world that throws us out and kneads us,*
> *caught in the embroidered nets of a life that was as it should be,*
> *and then became dust and sank into the sands leaving behind it*
> *only that vague dizzying sway of a tall palm tree. (ll.32-35).....*
> *And yet we should consider towards what we go forward to.*
>
> Cairo, 20th June 1942

The academic terms of Spring 2020, Fall 2020 and Spring 2021 will long be remembered, by both students and professors. For some, these semesters will be thought of as a time and learning waste, for others, they will be held as an adventure with new opportunities for learning.

Due to the crisis caused by COVID19, Aristotle University of Thessaloniki, along with universities across the globe, was compelled to shift abruptly and with no former preparation to remote teaching and learning.

Especially for educators in the Humanities this was a *terra incognita*, an unfamiliar territory which we had to navigate alone. Few, if any in our Department had taught an online course and I doubt if any member of the faculty had any experience designing or teaching in the online environment.

Here are my reflections to the following points:

(a) In the midst of the pandemic each of us, students included, had their own fears and unknowns about the uncertainties of the situation which unfortunately still remain for some. Also, many mentioned isolation, loneliness and information bombardment.

Some students seemed to be uncomfortable sharing their living spaces on screen so although I was not happy with the practice of switched-off cameras in the beginning, eventually I permitted them to keep their cameras switched off if they preferred.
I had the feeling and some students overtly complained that they were overloaded with classes and that it was tiring to be stuck sitting for long hours in front of a screen. They missed even simple exercise such as travelling or walking to college. Hence they seemed unable to manage their time effectively, or prioritise their weekly tasks.

Although collaboration has not long been part of our culture, students seemed to cooperate well. Chat was used to answer questions posed, either by me or amongst themselves and small groups, were also formed on social media to discuss classes, solve problems or exchange notes. On my part to maintain the feeling of a learning community in Spring term 2020, at the beginning of this online learning adventure, I organized a short series of extra curriculum seminars in which we explored what the classical texts reveal about the human experience of past epidemics and the issues of health and disease in ancient Greece. These seminars ran in parallel with the term's lectures and continued in the Fall after the summer break.

Unfortunately, members of the staff tasked all of a sudden with taking teaching online exposed no collective cooperation to help each other. We were not united to face the new reality with its plethora of common and urgent problems. Our ethos, unfortunately not being one of participatory culture and community, remained rigidly the same. We, the staff, saw each other only in the Classics Department meetings and in Faculty meetings which were also held online, not often, and mostly dealt with dreary bureaucratic procedures.

(b) Judging from the oral examination results and the participation in class I have the feeling that the students' learning was negatively affected. This was probably due to initial unfamiliarity with working in distant mode at an academic level. There were inadequate learning supports as many references were unavailable online and only accessible in our departmental and Central library, both of which were closed for more than a year.

(c) The loss of in-person interaction and social life was felt acutely. All were affected, especially those who were more gregarious by nature and they all seemed to resent the lack of freedom of movement especially during the second lockdown.

1st and 2nd year students had no chance to taste the pleasures, charms and challenges of college life, no chance to experience university as a temple of knowledge but also as a hub of cultural and political engagement.

It was considerably difficult for students coming from other places outside Thessaloniki. Some remained in their hometowns to save money while others, forced to sacrifice their independence, returned home evacuating the city. Those who remained in Thessaloniki were trapped in small flats often alone.

(d) One advantage was that all students had their own personal laptops and were familiar with installing apps. So setting up Zoom was not a problem. Prior and during the lockdown 1st year students of Philology had attended six two-hour compulsory seminars which aimed at familiarizing them with New Technologies and the tools for research.

The main shortcoming for research purposes was the inability to access our excellent and unique Library of the Department of Classics and develop the habit of utilizing and working in such a scholarly and stimulating environment.

(e) The Department of Classics does not require laboratory work, but has great dependence on libraries instead, both local and international. During lockdown we were handicapped with the inability to access many resources as not everything is digitalised.

(f) The continuing budget restraints in the Humanities and Social sciences were even more acutely felt during this period. Fortunately, funds were provided to the university for buying platforms which enabled distant mode education to run.

As time progresses there is increasing demand from both students and staff to reopen the campus following the COVID 19 precautionary protocols. If infections rise after the summer tourist season and the university does not open one may predict student unrest.

In conclusion: this whole experience has taught me as educator that we had put an effort to function under the circumstances but we are facing a distortion of the teaching procedure. Our aim as educators is not merely to transfer skills and information but to stimulate lifelong learning, to provide support, discussion and feedback, to encourage critical thinking, to set standards and demonstrate professionalism, all while acting in flesh and in freedom.

4.10 Ireland

As with most countries, the impact of COVID-19 on students in Higher Education in Ireland has naturally been marked by adversity, inequality, shock, and a profound sense of collective grief at what has been lost. Well-documented challenges included digital poverty and marginalisation, assessment confusion, loss of community, motivational struggles, isolation and loneliness, digital distraction, and inadequate learning supports in places. However, it is also true that the closure of physical campuses, and the sudden (and ongoing) digital pivot have equally given rise to examples of immense resilience, innovativeness and solidarity, as students, teachers, politicians, families, and all those associated with Higher Education have endeavoured to come together in different ways to develop and implement supports and solutions for the practical and personal difficulties that arose in, or were exacerbated by, the coronavirus pandemic. For instance, a major initiative by the Irish Dept of Further and Higher Education, Research, Innovation and Science in July 2020 was the announcement of a €168 million package of supports for further and Higher Education institutions and students - €15 million of this package was specifically ringfenced for providing students with access to the necessary tools to continue learning online, including laptops. By early 2021, 17,000 laptops had been delivered to students via this initiative (O'Brien, 2021) [59], which aimed to improve digital equity. However, the collective history of this period is still being written. To date, two special issues of the *All Ireland Journal of Higher Education* have been devoted to documenting the impact of COVID-19 on Higher Education in Ireland, including staff (teaching, library) and student perspectives and practical approaches [60]. The response to the pandemic within Higher Education continues to be captured in multiple ways, including research studies, webinars, blog posts, documentaries and conference presentations.

One of the most important effects of the pandemic relates to how students have helped *each other* during this time. All institutions have their own stories to tell of how students rose to the occasion time and time again. In Ireland, one of the most impressive examples of student peer support was the work of the student interns in the Irish Universities Association's **EDTL** (Enhancing Digital Teaching and Learning) project, which is a 3-year project, funded through the Higher Education Association's *Innovation and Transformation Programme* (https://edtl.blog/) [61]. The project aims to enhance the digital attributes and educational experiences of university students through integrating and mainstreaming digital technologies across teaching and learning practices in Irish universities; however, the onset of COVID-19 in the first year of the project led to a refocusing of the project goals to explore approaches to blended learning. A central pillar of this project is the idea of *students-as-partners*, working with faculty and policy-makers to enhance the digital learning experience for all. EDTL student interns were appointed in Ireland's 7 universities, to raise awareness and share their experiences of digitally-enhanced learning with the project partner. Working together, the interns produced a range of resources designed to support their fellow students during the online learning period – for example, *EDTL Approach for Students: planning for effective learning during Covid-19* (link) [62], a colourful infographic containing tips and guidelines for

students studying from home. In addition, through participating in regular webinars, the interns shared their invaluable perspectives and experiences of online learning, providing insights into what has worked well, and what can be improved Another example of student solidarity came from the students in the *National Student Engagement Programme* (NSteP), who contributed a reflective piece on student engagement and partnership during the pandemic to the *All Ireland Journal of Higher Education* (Hassan et al, 2020) [63]. The focus of this article is on the role of students in institutional decision-making, particularly relating to decisions made at different stages during the online pivot – a key focus is on ensuring the continued involvement of students in all decisions affecting their learning experiences in their institutions, even during the period when they are not physically on campus. These, and the many local examples of students working together in a spirit of collegiality and support, represent one of the few silver linings along the cloud of COVID-19.

Personal reflection

My first reflection on the initial response of my institution, UCD, to COVID-19 is included in the interdisciplinary paper presented at INSPIRE XXV in July 2020 (Georgiadou *et al,* 2020) [2]. This brief reflection focuses on my more recent experience during the current academic year (2020-2021), which has taken place fully online, and what I observed about the effect of the pandemic on my students' engagement with learning and how they navigated the year.

While the loss of in-person interaction and social life was felt acutely by the students during the academic year 2020-2021 as we moved in and out of lockdowns, and they studied from their homes or student accommodation on campus, some of the approaches we took as instructors helped to partially mitigate this. Student feedback for my first year digital literacy module (Autumn 2020) highlighted what worked for them under challenging circumstances. Some of the key observations are included below:

- Holding live classes via Zoom each week, rather than just providing asynchronous lectures to be watched in the students' own time. This helped to build a sense of community for the module and allowed the students to "meet" each other in the online space. It also provided a structure for the week, which the students found to enhance their motivation. Breakout rooms allowed students to chat with each other without the presence of the instructor, which is important for bonding. I also permitted students to keep their cameras switched off if they preferred, as some students might have been uncomfortable sharing their living spaces on screen.
- Recording each class, and making it available immediately afterwards, for students who may have lost connectivity, were unable to attend the live session, or simply wished to review it again. This is especially useful for students in different time zones (which was the case for some), or others living in noisy environments, where there may have been multiple distractions during live classes.

- Using online polling and the "Chat" function extensively during the class to generate lively discussion – to do this effectively, I engaged a tutor to monitor the chat and respond to students, since it was a large class (180+) and therefore difficult to manage alone. Many of my colleagues reported increased student engagement via chat, when compared to typical in-person classes – this has led us to consider how we might retain some of the more positive aspects of online teaching when we eventually return to the classroom.
- Careful structuring of weekly module content in the virtual learning environment (VLE), Brightspace, with a clear pathway through the learning activities and materials – again, this helped students to manage their time effectively and prioritise weekly tasks. While good practice in normal times, it is especially important during a period where students lack the typical structure of a day on campus.
- Retaining group project assignments (despite my apprehension). This turned out to be the correct decision, as it provided another opportunity for the students to get to know each other, although groups dynamics had to be very carefully managed in the online environment.
- Encouraging students to set up social media groups outside of class, to promote socialisation and bonding – most classes had their own WhatsApp groups, which they used for communicating with each other informally.
- Perhaps most importantly, maintaining consistent and friendly communication with students throughout, checking in with students who appeared to have disengaged, responding quickly to emails and messages, offering support where needed and providing clear instructions for everything. While this is essential in normal times, it is absolutely crucial during COVID-19, when students may be stressed and feeling vulnerable. A welcoming environment is an absolute pre-requisite for effective learning, whether in-person, blended or fully online.

As we slowly move towards a return to on-campus teaching and learning, we carry the lessons of 2020-2021 with us. Many of us, including students, are now more technologically savvy than before – the digital pivot has equipped us with new skills, that we may choose to harness in the future. Blended or hybrid approaches to learning may become more common in the post-COVID period. However, the pandemic has also raised awareness of the deep inequalities that frequently exist in educational contexts, from technological, socio-economic and cultural perspectives. It is to be hoped that the disruption and loss caused by the coronavirus may yet be channelled towards an improved future educational landscape for all students.

4.11 Kenya

Online learning as a mode of delivery is not new but due to COVID 19 higher educational institutions had to drastically embrace it. The decision to temporarily close educational institutions was actually prompted by the need for social distancing, self-isolation and to avoid large gatherings of persons as it posed a serious risk during the pandemic. The impact of the pandemic on Higher Education institutions was abrupt and as such there was no contingency plan other than attempting to continue classes remotely, through online classes.

(a) For students who usually undertake online learning, it was normal but for students who were used to face to face learning it was a whole new experience as it impacted on their socialization and also had an economic impact in terms of costs involved that was prohibitive.

(b) Learning was disrupted in Higher Education institutions in Kenya and the students had to shift from face to face learning to online learning. Some students feared the transition to online learning as they feared the unknown. Those in the most remote parts of Kenya with poor internet connectivity and lack of electricity were the most affected as they could not access the internet and lacked digital devices. They were left out as they could not attend virtual classes as such they could not move with the rest of their classmates.

A recent study on use of electronic resources by postgraduate students during COVID-19 pandemic at Masinde Muliro University using desk top research through review of different studies was done and an online survey conducted using Google forms; this methodology was adopted to elicit the required information. A sample of 18 postgraduate students at Masinde Muliro University of Science and Technology were selected from sampled faculties. The findings showed that electronic resources provide benefits for learning that are impossible physically, virtual libraries are accessible at one's convenience and everywhere as long there is reliable network connectivity [64].

The findings further revealed that a total of 66.7 % postgraduate students reported using electronic journals during the COVID-19 pandemic. 50% used e-books, 38.9 % used electronic thesis and 38.9% went for electronic research reports. 16.7% used electronic manual scripts while 16.7% reported they did not make of use any e-resources. The findings therefore indicate the preferred e-resources for majority of postgraduate learners are electronic journals and books. Liewet Foo and Chennupati [65] and Tenopir [66] established that that majority of postgraduate learners used e-journals.

(c) Students were affected psychologically as they were used to face to face learning, and they wished they could maintain that. Loss of social contact and socialization routines also affected them resulting to anxiety and even depression. Additionally, the students were used to being in personal contact with the lecturer but now this changed. El-Mansour [67] posited that traditional undergraduates were not adequately prepared to deal with online learning. Most faced the anxiety of the unkown, as they had never had any access to online learning, except for first years

who had done one course that was conducted using the university Learning Management System(LMS- https://elearning.mmust.ac.ke/).

(d) Some of the students lacked the digital devices required as they did not have computers, laptops or even smart phones. Some lacked electricity or missed out due to frequent power outages. The students also lacked internet connectivity and some who had it complained that there was low internet connectivity. The high cost of internet was the main challenge for most of the postgraduate students at 72.2%, followed by limited finances to purchase electronic resources at 44.4% and lack of computers to work on at the same rate. Poor network connectivity was another challenge at 27.8 and lack of login credentials, 5.6% mentioned limited knowledge on how to access internet resources. 56.6% of postgraduate learners reported that the library staff are not available for assistance when faced with challenges in accessing e-resources, while 44.4 % got support. An overwhelming 61.1% highlighted that they do not get any updates regarding e-resources during the COVID-19 pandemic, while 22.2 mentioned that the support is weekly and 16.7 % monthly [64]. Lack of infrastructure poses a serious challenge [68, 69, 70].

(e) Sociocultural differences were experienced by the students in terms of social class as students from well off families had an advantage over students from poor families. Those from well off families can afford laptops, computers, smart phones and can even access internet unlike those from poor families. Students from the marginalized parts of the country and pastoral families were the most affected. The nomadic lifestyle causes them to move in search of pasture for the livestock. They are equally affected by tribal conflict, natural disasters and displacement. There is definitely need for action by the government to support education in emergencies and displaced communities. Further those living in rural areas do not enjoy good infrastructure such as such they experience challenges of poor electrification and poor internet connectivity unlike those living in towns.

(f) Lecturers and students were trained on e-learning. Further some institutions of higher learning partnered with mobile phone providers to issue data bundles to both lecturers and students at a low cost. In some institutions such as Masinde Muliro University of Science and Technology lecturers and students were provided with data bundles and the institution catered for the cost of data bundles. The university LMS has played a critical role and has had some success. There technical support provided to staff has been instrumental for staff in preparing for their lectures successfully.

The closure of educational institutions is likely to affect education quality negatively due to disruptions in learning. However, by embracing online learning there may be continuity in learning. Students and lecturers should be continually trained on the use of various Interactive audio and even videoconferencing platforms and applications for instance Microsoft Teams, edX, Moodle, Zoom, WhatsApp, Google Classroom and Skype. Students should be enlightened on the importance of online learning especially in the wake of COVID-19 so that they may have a positive attitude towards it. Online learning should thus be embraced fully by institutions of

higher learning as this seems to be the new norm. There should be efforts by the libraries on availability of extended access or new additional e-resources including databases. The Library should organize regular virtual trainings through different platforms such as Zoom, Microsoft teams or Google meet to provide students with necessary search skills for relevant e-resources and exploring on the immense opportunities at their fingertips such as webinars, virtual conferences and online courses.

4.12 Nepal

In Nepal, there are 11 public universities with 1442 colleges that include 150 constituent colleges (directly managed and financed by a university) and the remaining are affiliated colleges (offers programs that lead to a degree by the affiliated university, but is funded and managed by either a community or a private sector) [71] These higher education institutions (HEIs), except for Nepal Open University, use in-person classroom set up for teaching and learning activities. After the government-imposed lockdown as a measure to contain the COVID-19 virus, some of these HEIs sought ad-hoc solutions in the form of virtual classrooms. Among these HEIs, Zoom is found to be the most popular tool used to conduct virtual classes followed by Google Classroom and Microsoft Teams. This may be because, Tribhuvan University (TU), the largest university in Nepal that enrolls around 79% of the students [72] started virtual classes using Microsoft Teams in the university's main campus and its constituent colleges. The university urged its constituent and affiliated colleges to conduct virtual classes wherever possible. [73] A few other universities also followed and started virtual classes, for example, Kathmandu University (KU) used Moodle and Google Meet for teaching-learning activities [74] Some affiliated colleges that comprise the largest portion of enrolments depended on the free subscription of Zoom to conduct their virtual classes.

HEIs decided to move their teaching-learning activities to virtual classrooms almost overnight. This was perhaps the only viable solution at the time. But the question is, was it a pragmatic solution in the case of Nepal. It may be a reasonable solution for other countries, but the situation is not the same in Nepal. Based on our survey data and discussions with HE teachers in Nepal, we will dissect and explain the problem in adopting the solution in terms of its *reachability* and *effectiveness*.

By *reachability*, we meant whether a virtual class is inclusive enough so every student can participate. Due to the ununiform distribution of university resources, many of its constituent colleges lacked both infrastructures as well as human resources with the knowledge and skills needed to run virtual classes effectively. The situation was not different for the affiliated colleges. Besides, their students come from different socio-economic backgrounds. A significant percentage of students come from poor families who could not afford a computer with an Internet connection. In addition, due to the rapid increase of COVID-19 cases in the city, many students left the city to return to their rural homes where there is no electricity and Internet connection. Not to mention, power outages and Internet disruption are common phenomena even for city dwellers in Nepal. The university's decision to

adopt virtual learning affected every student's reachability, but those with a weak economic background and living in the rural areas of the country were completely excluded.

The *effectiveness* of virtual classes in terms of student's academic performance has yet to be seen. But the picture depicted by our data and some recent survey studies [75], [76] do not leave room to be very optimistic. Students who participated in the virtual classes faced several challenges, for example,

- Students can use their own computer and Internet connection, but along with that they also required the necessary software to conduct and participate in virtual classes. Moreover, they need technical support from the HEIs to effectively and efficiently use the technologies that were almost alien to them some time ago. HEIs are found to be unprepared to effectively organize a virtual class. Many colleges do not have even institutional email for their faculties and students. Only a few HEIs use a learning management system (LMS). To host virtual classrooms, the affiliated colleges luckily had free services of Zoom and Google Meet. The students rarely received any technical support from their university/college and other organisations.
- Along with necessary hardware and software, reliable Internet connection and uninterrupted power supply are must both for conducting and participating in virtual classes. In Nepal, unreliable Internet connection and power cut are common problems. The situation of Internet connection and speed had aggravated during the lockdown due to a high demand bandwidth.
- To exacerbate the situation, the lockdown occurred towards the end of the academic year. This disrupted and delayed syllabus completion for the academic year, examinations required for transition or graduation from HE, and admission examinations and procedures for entry into HE. This has a significant impact on the university academic calendar. Moreover, it put pressure on course teachers to complete the syllabus in reduced contact hours. Consultation with a teacher when facing difficulties became rare and shorter for students in the virtual classes. Eventually, this has impacted students' academic interest and satisfaction. Most students who reported having a serious learning attitude before the pandemic now have degraded to a casual learning attitude. Furthermore, the pandemic has made an adverse impact on the students' learning, reading, writing, and studying concentration.
- The course designed and assessment method practiced by HEIs are highly based on face-to-face learning where most courses at bachelor level (this is important because 88.28% of the HE students are enrolled at bachelor level [72]) have laboratory works, which were most affected by the lockdown. For several study programs, they practice two levels of assessments. In the internal assessment, the course teacher evaluates a certain percentage of the

total grade. The students who have passed in the internal assessment are allowed to appear in the final exam conducted by the university for the remaining percentage of the total grade. The internal assessment was conducted online with a lot of uncertainty and confusion among students and teachers. Most of the students who participated in our survey are dissatisfied with their internal assessment grades. Add to their woes, their final exams have postponed and cancelled several times, and more importantly, the universities have no alternative plan or feasible option to replace this exam with.

- Decision to migrate to a virtual classroom was sudden and without any proper consultation from the related stakeholders, such as affiliated college managements, course teachers, students, and parents. Private college managements had difficulty in monitoring and managing their teaching and learning activities. Many teachers from non-technical fields of study lack even basic IT knowledge and skills, and they seldom use IT tools and services for teaching and learning purposes. Further, they have no formal training and experience in teaching online. Therefore, putting the responsibility on them to conduct virtual classes without any formal training was definitely not a rational decision. Then, there were no formal guidelines from the university on how academic affairs like internal assessment, laboratory works, field works, and attendance (some programs required 80% student attendance to be allowed for the university exam) should be dealt with. Students had not the same level of collaborative engagement as in a classroom, and a friends-packed classroom environment that they relished. And finally, parents were unsure about if virtual classes are worth the expensive tuition fee they pay.

Presumably due to these all challenges, the students believe face-to-face classes to be more productive and practical and thus preferred over other modes of classes. However, along with all these challenges, the students reported some positive prospects of the pandemic lockdown. They reported spending more time with family, and on physical activities that were waning due to busy life and increasing screen time.

Although this is the first time HEIs are encountering such an uncertain situation, they must learn from this pandemic and reform the education system in the country. University administration and educationists must revise and adopt appropriate and affordable curricula, pedagogy, and evaluation methods that can be fit for such situations in the future [76]. The government has the responsibility to solve the issues of Internet connection and power supply. Moreover, the government's perspective and priority towards HE must change and reflect through its policies, governance, and resource allocation. This is the time to be proactive and digitize HE in Nepal. Last but not least, IT knowledge and skills are must-have for every field of study. So, teachers from every field of study should learn and get familiar with needful IT knowledge and skills and utilize them for teaching activities.

4.13 Romania

Despite the chaos created by the onset of the COVID 19 pandemic, Higher Education in Romania reacted quite well to the challenges created. The vast majority of universities already had online platforms in place, which they used mainly for students enrolled in distance learning programmes.

Also, immediately after the first lockdown, the Universities' management created online meeting platforms for members of the teaching staff, distributed by faculty. These meetings created opportunities for professional development and efficient utilization of digital tools. This effort has continued through numerous training sessions and online conferences with this focus. If until March 2020, some teachers were still reluctant about communicating with their students virtually, this aspect not only has changed but has also met a completely new direction.

Even though it represented a new way of work, totally unknown for some, most of the teachers started to perfect their way of conducting teaching activities in an online environment.

Still, this year has also brought longer hours spent at the office, in front of a computer. The price paid was materialized in back and eyes pain, headaches, and a high rate of tiredness.

In 2020, at "Transylvania University" of Brasov, all the teaching activities were conducted online, throughout many concurrent activities, especially videoconferences. There were also asynchronous activities, formative evaluation activities, browsing of informative materials (course support, book chapters, scientific articles).

In order to find out students' opinions, we developed a questionnaire and distributed it to them through social media groups and conducted interviews via phone. Most students perceived the transition to the virtual model of education as very abrupt. Many were rather reluctant to the proposal to move to the online learning environment, but they still felt that they had adjusted at some point. One of the students confessed that "Initially, I liked the idea because I stayed with people I loved and didn't have to stay in the dormitory. However, after a few months of isolation, I wanted to go to university because I understood the teachers' explanations differently." Other students felt a higher level of anxiety, stress, or even disappointment with what they were initially offered. Fear of failure, lack of socialization, low levels of interaction had the most profound negative effects, even leading to a decrease in interest in a particular subject.

Student learning has been greatly affected. Many students felt they had to put in extra effort to cope with the demands. Also, the most demanded skills were organisational skills, especially time management. Many experienced difficulties in staying focused in front of the computer while watching online courses that were running synchronously. Some recognized falling behind in the material. But some

opinions highlighted the role of willpower in adapting to the new form of learning and felt that they performed very well, not being influenced by these changes. "I had the impression that I would not learn anything, but I was wrong."

All students felt that they had the appropriate technology to conduct their courses. Cases of socio-economically disadvantaged students were reported at the beginning of the pandemic to the university management. The measures taken were: provision of a high-performance device (laptop) for teaching activities and the creation of internet access for those who could not connect from home. However, many of the students noted these socio-cultural differences between students. Most of them refer to those related to economic status and social class. Gender, nationality differences were not noted.

In order to cope with the labs and seminars conducted online, many students felt that only by being actively involved could they understand the subject matter. Some aspects were extremely difficult to understand, but from January 2021, "Transilvania University" of Brasov switched to a hybrid mode of teaching and learning. Therefore, labs, seminars and practical work are conducted face-to-face, in small study groups, and courses are conducted online. Many of the teachers have been vaccinated before the new format started and meticulous procedures have been put in place to work in proper hygienic conditions.

4.14 Russia

Spring 2020 brought us to the challenges nobody could have imagined. Chinese coronavirus pandemic seemed to be far away and unrealistic. So when we were told to leave our classrooms for an uncertain period because of the danger of this virus it sounded like a nightmare. Having no experience (or rather poor) in online teaching, first feeling a babe in the woods, we had to learn new ways of sharing knowledge with our students, teaching them not only academic issues but ways to survive in new environment.

Both teaching staff and students thought of this transition to the digital world as an absolutely temporary change. Some were going to relax for a while before coming back to their university classrooms. Then the situation turned out to be much worse brining lots of people to stress. Everyday news on the number of people getting COVID19 and having health problems, reality of virtual mode of education, lack of access to the necessary equipment and the Internet, lack of face-to-face communication made the stress even more severe.

Samantha K Brooks et al [77] in their paper *The Psychological Impact of Quarantine and How to Reduce it: Rapid Review of the Evidence* published in *Lancet* in February 2020 introduced the results of a Review of the psychological impact of quarantine

using three electronic databases. They stated that most reviewed studies (the total number of papers found and analysed was 3166) reported negative psychological effects including post-traumatic stress symptoms, confusion, and anger. According to the research stressors included longer quarantine duration, infection fears, frustration, boredom, inadequate supplies, inadequate information, financial loss, and stigma. We could see similar problems in our students majoring in any fields at any level.

We teach different courses, English, Interpreting, Chemical Engineering (in particular, Modern methods of plastics processing and research) included. So it seems obvious that students studying Linguistics, Foreign languages and other Humanities didn't have as many problems as their fellow students studying Engineering as the former can get access to various linguistic materials (learning resources such as theory, exercises, videos) to master their skills even themselves in addition to their classes arranged by their professors. As for those studying Engineering they could have felt great lack of access to their laboratories and plants to develop their ability and skills in practical issues, e.g. carry out real plastics processing working on industrial equipment.

More and more students got tired of on-line education as they had to develop new skills in their course added to their common specialized knowledge and learning skills. As a result some students skipped all or most of online classes. Some students failed to send their homework done or missed classes because of technical issues (bad access to the Internet, failure of their hardware, etc.). The situation at the University was similar to that indicated in an analytical report *Lessons of Stress-Test: Higher Educational Institutions in Pandemic and after it*, [78] in particular more than 10% of students didn't have devices capable enough to provide them with all the characteristics and tools necessary for on-line education in the very beginning of lockdown.

New reality made impact on lots of students. As a result most of them would prefer face-to-face mode to online (those who felt lack of communication with both their professors and fellow student), though there are students realizing advantages of both modes and ready to enjoy blended mode as they have an opportunity to save time and money (spent for getting to the university and back home) as well as keep away from overcrowded buses and trains thus safeguarding themselves from the virus. They also appreciate new opportunity to manage their time and studying. Interestingly the frequency of personal communication with lecturers during distant education period decreased slightly while the duration of it at a time increased a little. At the same time both the frequency and duration of communication with fellow students decreased.

Thanks to university management students staying at the university halls of residence in spring 2020 got better access to the high-speed internet; engineering courses labs were postponed till the next term. As for autumn 2021 almost three months were delivered off-line in the university classrooms with safety measures

provided (requirement to wear masks, installing air-cleaning equipment, providing on-line lectures delivery, etc.)

4.15 Slovak Republic

My direct observations and experiences that I want to present are from the Trnava University in Trnava, where I work as a university professor at the Department of Mathematics and Computer Science (Computing) of Faculty of Education. The position of our department is specific in that we are responsible for preparing all students of teacher training programs for the use of modern educational and digital technologies in school practice. In addition, our department guarantees quality training of teachers of computer science and mathematics in connection with another approbation subject. All accredited study programs can be freely combined in pairs. The most popular and numerous study groups include computer science with mathematics and computer science with English language and literature. In smaller numbers groups for computer science as second subject, our students (future primary and secondary school teachers) will choose biology, chemistry, German language, etc. Our task is not only to equip students with theoretical knowledge of their approbation subjects but also to prepare them for the future teaching profession - to be a good teacher. Therefore, pedagogical practice directly at primary and secondary schools is a part of teacher training at the university. However, the study programs did not take into account that pedagogical practice will also be implemented remotely in a distance way. A difficult situation arose that needed to be addressed. During pandemic primary and secondary schools had enough problems of their own and refused to admit students to practice. The well-established system of pedagogical practice did not suit, it was necessary to change it during the process. At the same time, other shortcomings in the training of future teachers surfaced.

The training of teachers in the field of implementation of modern didactic tools and technologies to support education was focused on the full-time (present) form of teaching. The creators of the study programs, as well as the authors and implementers of educational software products and electronic educational materials, did not anticipate that distance education would become the main form of education in compulsory school attendance. Distance teaching and distance learning were rarely used under normal condition, and individual study programs were also implemented only rarely. (This is only the case with integration in different ways and to different degrees of disabled pupils, athletes, excellent sportsmen, exceptionally gifted children, etc., who could not fully and regularly attend daily classes). Developments during the COVID-19 pandemic have shown that distance learning can become a harsh reality overnight. At that time (already during the first wave of the pandemic) all schools were forced to accept this reality and solve the problem of education operatively. A situation arose where a number of problems had to be solved "on their own" and answers were found to many questions related to the operational solution of the problems.

How to continue teaching? What tools to use? Which environment to apply? How to involve students in the educational process? Will students have sufficient and suitable technical and technological equipment? Will online learning work on

mobile phones, tablets, computers or laptops? These and many similar questions have been asked by teachers and school principals. Each school chose its own path, its own approach and strategy, and used different tools and environments to implement distance (online) education. It was common practice to use many video conferencing systems in one school. Each teacher chose the one that suited him best (or who he knew) from those that were available.

There was a lack of any central coordination (or arrived late), not only in connection with the use of tools, but also with the preparation and implementation of the learning process. Sometimes students had multiple online activities scheduled at the same time and had to learn to use numerous environments that they were not used to. The instructions of the Ministry of Education came too late and the schools acted to the best of their knowledge and belief and at their own discretion and assessment of the situation and conditions in which they found themselves. Higher education institutions preparing teachers have solved the problem of changing the concept of study programs and innovating the content of many subjects in teacher study programs. To carry out a curricular transformation, they had to find the right answer to many questions. What needs to be included in teacher education programs at universities? Which problems and topics are general regardless of the studied teacher specialization and which are specific and are related to subject approval?

Forced distance learning during the COVID-19 pandemic indicated various problems and confirmed certain facts that did not manifest themselves in the daily forms of teaching implementation, or they were not so obvious. These include the following:

- Schools, teachers, and students have not been and still are not well prepared for the distance form of education;
- Teachers, although skilfully preparing various e-learning tools and applications for full-time teaching, still lack experience in creating online materials and providing online education;
- There is a lack of coordination, cooperation management and planning of the process of creating educational materials, both in terms of content and form;
- School information systems are rarely used in full and many of their functions are not known to teachers or school management;
- For the lack of competencies, professionalism, knowledge and information about SIS for the management of primary and secondary schools and school facilities as well as their selection for a particular school, it may be pure coincidence without the belief of the correct choice;
- Teachers did not meet and, until the pandemic, did not use any complete software systems for distance (online) education in the full range of curricula;
- Schools have used and continue to use different distance education systems, and in some schools very often more than one at a time;
- Schools are not sufficiently informed about distance learning opportunities as well as the digital learning materials they have at their disposal, the educational portals, websites and nests (and their contents), which are freely accessible and which they are free to use.

Therefore, it is important that future teachers in the field of higher education acquire sufficient knowledge about the forms and means of distance education and also that they know the basic school information systems that are currently used. Teachers' knowledge of information systems must be broader and deeper than at the level of a skilled intelligent user. They need to know what SIS services they provide and how to use these services effectively. As part of pedagogical practice, they must also gain practical experience in using SIS. Computer and Internet security, personal data protection and current legislation cannot be ignored in the use of ICT and modern SIS. Security and reliability of information systems are among the basic requirements for their deployment. Information systems are constantly exposed to various risks, such as information leakage, information system failure due to weathering or human error. For the proper functioning and credibility of the information system, the mentioned risks should be prevented, or at least timely preparation of potential users - teachers and school management. Therefore, knowledge about SIS must be included in every study program of teacher training. It would be best to include their teaching in the common ground that is the content of all teaching programs.

Another acute problem that needed to be solved was the problem of how to implement the teaching of practically oriented subjects. Examples include laboratory work in physics, chemistry, biology, computer science, design tasks, construction and programming of robots, and many more. Here came the word implementation of practical exercises according to the video-instructions, the use of educational films and videos, the use of virtual and remote laboratories, trainers, emulators, modeling, the use of simulation tools, virtual and augmented reality, etc. A comprehensive solution to this problem is more difficult and there is no room for us to discuss in this paper. We have described and presented some solutions in more detail at many national and international conferences in 2020 (IATED, IMSCI), [79, 80]

For example, in teaching programming in distance for online, we have successfully used the MS-Teams screen sharing function. The teacher could present the problem on his/her screen to show and explain the solution to the problem and the procedure for debugging the program. Similarly, the student could present his/her suggestions and ideas for a solution, and the teacher and other classmates could advise and help him/her complete the program and improve the software application.

It is true that the teacher stayed more at home during the pandemic than under normal circumstances, but this does not mean that she/he had more time for the family, to enjoy time together, to relax and have fun. Obligations of children in distance learning; preparation of study materials and own teaching; control and correction of submitted tasks are very time consuming. Teachers are exhausted and tired and often "burned out", but they live with the hope that the emergency will end in the foreseeable future.

4.16 Spain

As humanity today faces an unprecedented, multifaceted crisis, its consequences have not left the education sector unaffected, at all levels [81]. In fact, the phrase "I attend the university" takes on new dimensions in the time of the coronavirus. The scenario of uncertainty created by this pandemic is on the agenda for future actions and guidelines, as the challenge that arises is the management of today and the preparedness for tomorrow.

(a) The transition of Higher Education from the traditional form to the online has disrupted the regularity of academic life. In Spain, schools and universities were initially closed precautionarily in early spring of 2020, following a similar course with most European countries, as Greece. In the universities any academic activity is carried out at a distance and research, teaching or supervision is conducted remotely, via e-learning or digital platforms. Indeed, ministries issued instructions for the conduction of distance examinations at universities and the support of the doctoral dissertations of PhD students.

But the question remains; how satisfied were we with this rapid migration to fully virtual education in the age of the Coronavirus pandemic? As the direct interpersonal contact, along with the interaction, which are key components of every learning process [82, 83], are lost, not only the form of education but also its qualitative elements have changed.

(b) As a person, who has multiple roles, I faced special challenges during this period, trying to personally address the needs arising from the pandemic. The psychological footprint and the impact of the pandemic is part of my daily life and is something I have been reflecting on from the perspectives of being a school psychologist in a special education school, a PhD researcher in psychology at a Spanish university and a member of a family and a community that is being affected this period.

For the last 3 years I have been researching the roles and tasks of the school psychologist, a profession that has changed significantly in the last year. In particular, a variety of strategies have been adopted to continue the psychological support of children, through online counseling, etc., involving both in-person and remote strategies [84]. Moreover, it is quite possible that psychologists themselves have changed as professionals, in significant ways as the pandemic develops [85]. In fact, what the pandemic brought about was a shift in mental health and mental resilience.

One of the difficulties I had to face was the change of both my working status and the subject of my dissertation under investigation. At the beginning of the pandemic, as observed by Farmer et al. (2021) [86] while many educational institutions have chosen to adapt instructional materials to be delivered online, it was not clear whether the same was expected from the school psychological services. This uncertainty was reflected in all aspects of my activities.

The above conditions have raised strong doubts about my research ideas and whether they are now obsolete. Doubts arose about whether the roles traditionally assumed by the school psychologist, actually meet the psycho-emotional needs of the school

community and families during the pandemic. In addition, I began to wonder whether the role of the school psychologist should now be expanded in order to meet the needs of the wider community, as the school is part of it. What is the role of the school psychologist in strengthening the mental resilience and well-being of teachers and families began to concern me. Given the relevance of psychology to the current health crisis, it is a new challenge for me to include the above issues in my research projects.

Within the new working conditions, what it was needed was to maintain a balance between working demands and academic requirements. The paradox encountered at this phase was that while I was also affected as a person by the lockdowns and the pandemic I had to mentally strengthen the students and their families and at the same time to study the role of the psychologist, as an external observer. This certainly seems like a major challenge for a professional.

(c) Undoubtedly, doctoral research is a complex, demanding and time-consuming process, which can offer a path full of opportunities for critical thinking, learning and insight. Regarding my university studies, they have been moved from person to person in online work, through applications such as Zoom and social media, e.g. Viber, Skype. At the same time, during the period of the temporary closure of universities' operation, the Education Ministries in both Greece and Spain, decided that the process of public support for doctoral dissertations should be carried out by distance methods, via video conferences.

Although I try not to affect the speed with which my dissertation is processed, when events are in full swing, the course of the dissertation goes backwards, especially considering the fact that Spain is among the countries most affected. The frequency of communication with my supervisors has decreased significantly, particularly in the second wave of the pandemic in Europe.

During this period, the paradox is observed that while we all have much more time, we tend to remain more immobile and inactive. However, this situation seems to have worked in my case, as I managed my time quite wisely. Thus, the time I would once devote to activities outside the home and work, is now devoted to my doctoral dissertation.

(d) Research efforts since the beginning of 2020 have shown the impact of the pandemic on the psychological functioning of both students and adults, with a particular focus on the impact of lock-in, school / university closure and quarantine on adaptation, especially in more affected countries, e.g. China, Italy and Spain.

Indicatively, the literature shows that during the quarantine period many people experience anger, confusion, symptoms of post-traumatic stress, etc., as a result of changes in their daily routine and working conditions [87, 88]. Additional challenges include feelings of loneliness and sadness, social alienation, increased time in front of screens and reduced physical activity.

Personally speaking, the pandemic situation also has a significant effect on my personal resilience. Practically, my support network was limited, as my friendly and relative network was forced to move away and thus I turned to other spiritual

influences for guidance and motivation. This lack of support in the current situation prompted me to discuss these issues within my doctoral dissertation.

An important struggle during this period has been the inability to separate work from home. Working from home and the lack of space as an office, both for my work as a psychologist and for my research work, I feel is a form of intrusion into my family and personal life. Undeniably, this condition is a very stressful situation for many people.

The COVID-19 pandemic has created instability, anxiety and fear, and there is great uncertainty about when schools and universities will reopen and this crisis will subside. The things that until recently we took for granted (education, work, etc.), are now on hold for an indefinite period, which affects our mental well-being.

In conclusion, I believe that these reflections, although subjective, emphasise the universality of emotions in such circumstances. Sharing common views and emotions can give us a sense of security and acceptance, as we do not feel alone in this scary and anxiety- provoking period. As we often tell our students, in order to show them the need to seek psychological help and support, ***"even Superman goes to his psychotherapist to discuss how he feels about his accomplishments,"*** it is helpful to seek for help, if necessary, especially in the "stay at home" period.

4.17 Turkey

(a) In the midst of March (13rd march), 2020 face-to-face education stopped in in Higher Educationinstitutions. For two weeks there was an empty period. As it was the beginning of new pandemic period, which was quite unknown initially, Higher Educationinstitutions and Higher EducationCouncil needed to prepare infrastructure for distance education and make new regulations, make new decisions and choose the following path to go. When the teaching and education activities stopped, students left the dormitories and went to the cities where they parents live. For a week students and lecturers waited. During this time Higher EducationCouncil of Turkey took infinitives.

(b) Approach of Higher EducationCouncil of Turkey: According to the press speech of Prof. Dr. M.A. Yekta Saraç (Head of Higher Educational Council of Turkey [89], in one week time model planning was made and examples from the world were analyzed. Decisions of the authorities of Higher Educationcouncils and universities from United States of America and European Countries, where the pandemic crisis reached the top, were examined and analyzed. Universities in Turkey were asked to inform the Higher Educational Council about their infrastructure, capacity, sufficiency or insufficiency for distance education. Pandemic Consulting Commissions were established in the universities in Turkey. Route Map of Digital Transformation during pandemic crisis was prepared. This roadmap has five sections:Legislation, Infrastructure, Human Resources, Content, Implementation. In terms of Legislation, major changes were made in the Rules and Procedures of Distance Education. According to the new decision made, distance education will be activated providing that it shall be limited with only this pandemic period. As for the Infrastructure, feedback from the universities were evaluated. It is satisfying that

many universities have capacity for distance education. Before the pandemic 123 universities in Turkey had UZEM (Distance Education Teaching Implementation and Research Center). Also for the field of Human Resources, there were some investments. For example, within the frame of Digital Transformation Projects, training was given to more than 6000 faculty members and 50.000 students 2 years before the pandemic by Higher Education Council of Turkey. The other factor was Content. Yekta Saraç told that many faculty members and lecturers in Turkey have experience of preparing content. After his speech, in the new starting pandemic education period, the universities opened their course materials and contents for open access. Also Anadolu University and Istanbul University, which were providing open and distance education, besides their formal education program, opened their digital materials and recorded courses for open access.According to the decision of YÖK (Higher EducationCouncil of Turkey), common course materials were opened for access.

(c) What did universities do?: With the sudden outbreak of pandemic crisis, universities improved their distance education infrastructure, rapid meetings were held out with lecturers, faculty members. New working bodies and teams were established within the universities to manage the Distance Education System of Universities. Committe meetings were held out within the universities. Some universities employed new IT staff to contribute to the efficient running of the distance education systems. Orientation programs were applied to students and lecturers. Also various trainings on how to use distance education tools, how to make video edit, how to prepare video material were made for lecturers and faculty members.

(d) From the perspective of students: As a research assistant working in the university, I witnessed what students experience during this process. Some students reported that they found it hard to adapt to the new system, their social life has ended and they cannot concentrate on what they do. They were concerned about how the exams would be carried out, how they would make their presentations and how their performance would be graded. Some students did not have Internet facility at home, some had fewer financial opportunities to get Internet service for their home. I the university I work (Ankara Yıldırım Beyazıt University) we had some international students from Africa and other less developed countries. Some of our African students returned to their countries. Due to the poor infrastructure of Internet, they could not access to courses or distance education system. Some of the students did not have necessary equipment and they used their mobile phones to connect to the system. From the other hand, there were also students who enjoyed this period and who found it more fruitful to work from home. Some of my students reported that their scores got higher during Pandemic. Some of the exams turned into assignment version and they told that they found it more practical than multiple choice or open ended question format exam.

(e) From the perspective of lecturers: Some of the lecturers I witness during COVID 19 pandemic reported that working from home is saving time and energy. We do not spend time for transportation or driving but we put our all effort to enable the student participation in the class, or dealing with system errors, problems that occur two or three days a week. They told that sometimes their Internet connection got poor as

well. Even though working from home seemed attractive at the beginning, it can be problematic to resolve system problems in the middle of the course. They reported that because of the system problems, they lose their concentration in the course. Also they say that when the camera of the students are closed, it is hard for them speak to the screen and get motivated. They also spent a lot of time to prepare video recordings for the courses. They recorded some of the live courses with students but some said that it took time to edit the videos later. But now they also report that they got used to this system and the infrastructure is getting more stable. They have learnt to cope with this process and this process might be the beginning of new hybrid system and they prefer to use hybrid system in the post-pandemic process.

4.18 United Kingdom

4.18.1 The impact on students in the UK: reflections of a parent

United Kingdom (UK) universities have mostly been functioning online since March 2020. In 2021 we have been allowed to run some health related programmes on campus where there was no other way of delivering the curriculum. Some research students have been able to return to their labs under very strict safety measures. Current UK government advice [90] is that we can return to campus in May 2021, but the reality for most UK students is that the academic year is over by then. September 2021 is now the planning date for any significant return to face to face teaching.

I have two daughters, one who is in final year at university and the younger who is at a further education college and will go to university in September. These are my reflections on their experiences and those of students at Middlesex University where I work as a library manager.

Our youngest has done the entire university application process virtually. There have been no visits to campus. Visits may become possible later this term, but that is too late decision making as choices have already been made. She will be arriving at a University to study and seeing it for the first time the day she arrives. This is reflected in the Middlesex University information for prospective students [91].

For our eldest the move online have had benefits. Of all the changes, recorded lectures online are much preferred as she can do the lectures in the best order for her. This is something she would like programmes of study to keep, rather than going back to live in person lectures. She told me of the advantages of focussing on one subject in the morning and another in the afternoon rather than back to back live lectures where the second lecture overwrites the learning from the first. Our younger daughter is dyslexic and so lectures she can pause and rewind are much preferred to trying to keep notes and keep up with the tutor. For students who have other disabilities the recorded lecture is a vastly better option. It is ironic that COVID has delivered for disabled students a vast improvement in provision in a way that years of campaigning never did.

On the down side 2020-21 has not been the final year my eldest expected and it has on occasions been an isolating experience with very limited social contact outside her flat of six friends from January to April. Her boyfriend, who she met shortly before going to Canada for her 3rd year, has seen very little of her since she hastily came back in March 2020 because of lockdowns and the need to protect parents and grandparents from the risk of infection. It did not help his home city was a viral hotspot under the strictest of lockdowns for much longer than other parts of the UK. Worse still, the year below my eldest daughter are students who were supposed to go overseas to study as she had and have found themselves studying overseas from the UK. Not the gap year they had hoped for.

Middlesex has 65% of its students who normally commute from home. The reductions in public transport and in particular bus capacity means that even if we had been able to move back to campus this year, travel to and from campus would have been challenging for our students. In the absence of teaching on campus, they have had a very limiting social experience. This is not how university was meant to be.

This situation has been even harder for new first years who might be in a hall of residence flat with people they have not chosen to live with and harder still for those international students who came to use and had to quarantine. Middlesex students have told us how hard it is to live and study in a single room day after day. We have also had to meet more basic needs with Student Welfare having deliver food parcels to self-isolating students. We have seen an increase in demand for mental health support. That team have found online support works much better than expected and has enabled them to be more flexible in times of delivery, so has actually improved the service we can offer students.

To support our students Middlesex University has lent out over 1000 laptops to students with none and spent hardship funds on internet and WiFi for students in homes with poor connections. We have many students from poorer families, a situation compounded by parents being furloughed from jobs. Students have found themselves in competition with siblings still at school needing access to the family computer and, in the case of one programme, the professional body requiring an exam means whilst the exam is in progress no one else in the family can use the home internet lest the proctoring software reads their use as an attempt by the student to cheat. This is very much an exception, most assessment having moved away to more realistic formats. My eldest has become familiar with the open book exam run over a 24 or 48 hour period, the assessment assuming books are being used but designed to ensure it tests students reflective and critical thinking, which is harder to cut and paste.

Where will students be next academic year? The hope is that the UK vaccination programme will have reached 18 year olds by July 2021. Will this enable a return to normal or will mask wearing and some social distancing need to continue? At the time of writing, we simply do not know.

4.18.2 United Kingdom - Reflections of an academic

The majority of the Faculty of Science and Technology students at Middlesex University London, UK have had their teaching delivered online. There is still much uncertainty with regards to students returning to campus but there is talk of using a blended approach at the start of the 2021/22 academic year in the Autumn of 2021. At an operational level, the suggestion is that large lectures will remain online, whilst smaller, more intimate, lab sessions will take place on campus. Academics were given choice over which platform they chose to deliver their teaching. I chose Adobe Connect because this was used by the majority of colleagues in the Business Information Systems teaching cluster. Here are my reflections to the following questions.

(a) At the very beginning, the overall feeling amongst students was of anxiety over the uncertainty that the pandemic bought. These feelings of unease and worry dissipated, but never totally disappeared, after the first month of online teaching. Once the students had acclimatised to the new online environment, and a structure and regime had materialised, the majority did feel comfortable.

A minority did feel frustration over the denial of having face-to-face, on campus teaching. They felt that the university owed them a partial refund on the fees that they had incurred and paid. Interestingly, my observations are that those who voiced these concerns were the usually those weaker students that struggled with independent learning.

(b) The Systems Analysis and Design module that I teach on the Business Information Systems and IT degree programmes was well-suited for the online environment. My experience would argue that their learning might have actually been enhanced. This is substantiated by the final grades achieved by the cohort in this pandemic year, which were markedly better than the performance of students in past years. The pass rate went up and the average modal grade for individual assessment components also slightly improved across the board. Also, very positive feedback was received from the student boards where students' representatives are given a chance to feedback to departmental management concerning students' learning experiences.

(c) Every week, I ran a three hour online Academic Advice Surgery. This timetabled session was open to all students and offered both academic support with taught modules and pastoral care. Many used the sessions as an opportunity to socialise, as opposed to using it for any academic purposes, allowing them to share their personal experiences. Over half of these attendees did comment on the difficulty of working from home and the denial of in person, human interaction. Interestingly, in one case a student did state that the whole purpose of attending university was to escape the domestic setting, where she felt enslaved, and to be liberated and free to enjoy the company of friends and peers on campus. She was basically escaping servitude. The denial of escaping this due to the pandemic had a severe impact on her psychological health. However, there was also a subset of the cohort, approximately 40%, who were typically highly motivated and academically strong, who enjoyed the challenge

of working independently from home. They were students that had the support structure at home (usually free from any domestic responsibilities, a personal space in which to learn, the access to unfettered access to good technology, etc).

(d) Middlesex University London has been able to loan laptops to the student cohort. Staff, including I, have been able to have laptop machines delivered to our addresses, in order that we can deliver teaching from home. There was a sudden realisation, a week into delivering the online course that my internet and WiFi connections were poor. Thus, a new Internet Service Provider was sought, and an upgrade followed a week later. There was a financial cost, which was not picked up by the employer. The online learning and teaching sessions did reveal that a number of students also faced the experience of having poor internet connection. However, some were less unfortunate and did not have the means to upgrade.

(e) The students registered on the Information Systems Analysis and Design module managed their lab work quite effectively from a distance. Adobe Connect has a Whiteboard facility, which was used extensively by students to draw and model schematic models, when sharing their answers to lab exercises. Likewise, tutors could annotate these answers instantaneously with feedback in a live setting. In order to reduce the load on available bandwidth, most of the tutor/student communication was via audio only. On many occasions, when video was used there would often be buffering on the connection, thus reducing the quality of the leaning and teaching experience. The Breakout Room facility in Adobe Connect did permit small groups of students, typically 3-4, in a lab session of 20 students, to be able to talk and share screens in real time. This facilitated the social aspect to learning in the lab sessions.

(f) There were clear guidelines and support provided by the department and the wider university in terms of delivering online teaching. Although I would argue that it was not comprehensive. A small example to illustrate this is the failure to consider whether both students and staff are working from home in an ergonomically safe environment. For example, is the learning and teaching taking place in a well-lit, well ventilated environment, is the furniture (chairs, tables) minimising physical effort or discomfort, etc. Because the pandemic has shifted work online it does not mean that an employer or service provider abdicates all duties and responsibilities of health and safety of its workers/consumers. And this should be addressed by all employers and fought for by all employees and trade unions.

4.19 United States of America

The academic terms of Spring 2020 and Fall 2020/Spring 2021 will long be remembered, by both students and professors. For some, these semesters will be thought of as time and learning lost, while for others, they will be remembered as an adventure with new opportunities for learning. During the Spring 2020 semester, I was living and teaching in Vladimir, Russia as a Fulbright Scholar. When news of university closures and the ending of face-to-face instruction in Russia was announced, my teaching as a Fulbright was finished, and I had to return home to the

United States. As such, I did not have to rapidly migrate my courses to the online format for the Spring 2020 semester. I would have to transition all of my courses to the online format for the 2020-2021 academic year. However, I did have some time to plan and prepare for this. Here are my reflections:

(a) During this time there were so many unknowns. What is this virus? Will I get it? Will I die? Will someone in my family be affected? What about my job and my income? What if? Life as we knew it changed in an instant. During such a stressful time, it is hard to imagine that much academic learning could occur. However, I believe that there are students that thrive in the online classroom, while there are some students that are best situated in the face-to-face classroom environment. According to a report by Celia Miller (2021) [92], 43% of college/university students enrolled in traditional face-to-face classes had not taken online classes prior to the transition to online due to COVID policies. Furthermore, in 2019, only 46% of faculty members stated they had taught an online course. Given that, consider that about half of the student population had little to no idea what to expect for online learning, while only about half of the faculty had any experience designing or teaching in the online environment, all in the midst of a pandemic with its own fears and unknowns.

(b) I believe there are some courses that are absolutely well-suited for the online environment; and for the student that is well-suited for the online environment, their learning might have actually been enhanced. There are, however, some courses that are not or actually cannot be taught online. For example, I teach an Electrocardiography and Clinical Exercise Testing course each fall semester at my university. I have been teaching this course as a hybrid course for several years now. I have found that teaching the electrocardiography (ekg) component of this course online has actually improved learning outcomes. It is impossible, however, to practice clinical exercise testing online. Due to CDC guidelines and COVID restrictions, students and faculty were not able to meet in the lab to practice these skills, and the equipment required for skill development is very expensive; in other words, no one has an ekg machine capable of running a treadmill in their home to practice clinical exercise testing. It is one thing to watch a video of it; it is quite another thing to operate all of the equipment independently while working with a test subject walking on a treadmill and hooked up to an ekg. Lab-based skill development learning most certainly was negatively impacted.

(c) As mentioned previously, with so many unknowns, this pandemic has been a highly stressful time for everyone. That alone impacts ones' psychology. I do believe, though, that the required online learning modality affects individuals differently. There are some for whom the transition has been accepted and embraced, while for others, it is has had a negative impact on their psychology. Data from my students in the US indicated that just over half (56%) preferred face-to-face learning, while 35% preferred mixed online/face-to-face, and 9% preferred online only. Common themes for why students preferred each are as follows:

i. Face-to-face – human interactions, they hate technology, need it for motivation and focus.
ii. Mixed and Online – accessibility, no class cancellations, flexibility for work schedule and family life, not having to leave home

Given these reasons, it is easy to understand that depending on the perspective and personality of the student, a student's psychology would be affected differently. For those that desire human interaction in-person, their psychology would tend to be more negatively affected, while a student who enjoys working independently from home and is now able to manage school requirements with family and work obligations would tend to be more positively affected.

(d) It is a requirement for students attending our university to have a computer or laptop. All respondents to the study survey indicated that they had some form of technological device and Internet service.

(e) As discussed previously, some forms of laboratory work are very difficult, if not impossible to study outside of a laboratory. However, it is possible for some types of laboratory sessions to be held and potentially even offer superior results. For example, I teach two sections of a course called "Personal Fitness." This course consists of "lecture" and "laboratory." The lab component of the course consists of teaching of and training in various forms of physical activities. Obviously, some of the workouts have had to be adjusted – we are not able to teach/train with weight machines or meet in-person for group exercise; however instead, lab sessions have been meeting via Zoom where instruction is based on activities that can be conducted in the home, with equipment found in the home. As lab classes are held via Zoom, we are able to see our students completing the activities and can provide feedback, and they are able to watch us leading the instruction.

I believe that this type of instruction, at least for some students, may potentially be superior to how we have always taught/conducted lab classes. By this I mean that students are now being taught for an entire semester all different types of at-home exercises, all while they learn and realize that they can exercise from home. The reality of physical activity participation is that a majority of Americans do not get the recommended amounts. As always, the most common reasons for this are lack of time and lack of money for gym membership. Our students are now being taught that they can find time to squeeze in some exercise using what they have available in their home, so time and money are no longer valid excuses for not exercising.

(f) I believe that most all of the policies that we received came from the Centers for Disease Control and Prevention (CDC). While some of these policies hindered the education process (such as not being able to practice skills in the laboratory as stated previously), these policies were designed to stop the spread of the virus.

4.20 Summary of section 4 on reflections

Reflections by their nature are bound to be largely subjective. However, through the different experiences of the authors it was still possible to identify common themes, problems, anxieties, and opinions.

The uncertainty and pressure caused by the pandemic presented challenges which had to be addressed within a short time. Availability of and access to suitable/adequate technologies as well as training of the staff, who were unfamiliar with using online teaching platforms is a shared problem faced even by institutions within advanced economies. A regional variation in internet technologies continues to pose problems.

Social divides were exacerbated during the pandemic. Sociocultural and socioeconomic differences were experienced by the students in terms of social class as students from well off families had an advantage over students from poor families.

Lab-based skill development learning was negatively impacted upon. Much creativity on the part of the academics enabled the development of simulations which addressed these problems.

Despite the uncertainty and pressure caused by the COVID-19 pandemic, the co-operation and flexibility of universities and schools created solutions to address the challenge. The pandemic also posed a necessity to review the technology and internal competencies for digitized delivery of the teaching and upgrade the systems and knowledge to develop an online learning culture.

One of the authors who is a PhD student concluded that "Sharing common views and emotions can give us a sense of security and acceptance, as we do not feel alone in this scary and anxiety- provoking period students do not feel alone in this scary and anxiety-provoking period."

5 Proposed strategies for alleviating the effects of the Covid-19 pandemic on HE

It has been argued in Mystakidis et al. (2020) [93] that the HE world of e-learning and social virtual reality learning environments, in general, should historically be examined as in the pre- and post-coronavirus times and that any HE learners' needs and learning innovations should be classified accordingly. In this section, the authors based on the needs analysis that appeared from the international research study present suggestions for future improvement action and learning innovations generated by the university and college educators and co-authors of this paper and by the HE students themselves.

5.4 Proposals from co-authors/educators

In the light of experience gained from February 2020 to May 2021 it was found that online education (despite the initial shock) with appropriate attitude and policies could:

- promote learning innovations in university education;
- strengthen the exchange of teaching experiences, and the sharing of excellent courses;
- make the teaching process more standardised;
- enable all students to have more flexibility to arrange their own study time;
- improve the effectiveness and utilisation rate of classroom teaching;
- improve the motivation of the students to learn independently;
- attract students' interest in learning through the variety of forms and style;
- provide the students with multi-dimensional, multi-levelled, diversified development spaces.

Notwithstanding, problems persist and, thus, the authors propose the adoption of a strategy based on openness, transparency, and sharing of resources and knowhow. In particular, the authors propose the following:

- Provide training to educators: Although many educators might be able to use various e-learning tools, applications and platforms they still require training for the preparation of materials and for providing online education. Educators from non-technical subjects are likely to require additional training and support.
- Encourage and identify innovations used by the academics (such as animations, simulations, videos, as well as group work) which can alleviate anxiety and enhance the engagement of their students.
- Ensure co-ordination and co-operation between management and academics for the migration to and implementation of a virtual model of education.
- Identify students from socioeconomically disadvantaged groups, so that additional help can be provided (at least for WiFi access & loaned laptops).
- Identify students vulnerable to isolation, depression, and well-being: provide support through more regular contact and encouragement.
- Develop and use awareness training to both academics and students on the dangers from cyber-fraud, violation of privacy, and cybersecurity.
- Seek ways to involve the students more into the learning process.
- Seek ways that would promote student interactivity with each other and with the lecturer, promote group work during class time and outside that, and overall strive to make courses more interesting to the students.
- Enrich the course contents and context with new activities such as video presentations, demonstrations of problem solutions, class debates and discussions.
- Incorporate group work which encourages co-operation and support from student to student.

5.5 Proposals for improvement made by the students

All the proposals made by students are listed below in italics.

- *Mental health factors should be more in focus rather than the technology and the different program solutions.*
- *Moreover, recording lectures provide useful to students that work (and can't attend live classes), and students that want to revise. Wish you the best with your research!*
- *The books at the library should all be online.*
- *Platforms that are safe should be used more (If I am not mistaken Zoom has some bad history and as we were doing lectures everyone could access before they changed it to private e-classes after a whole semester).*
- *Tutors should make a Twitch channel so the students can support them with donations and subs.*
- *The EU needs to hurry up with the vaccination process so that I can go back to my life and continue my studies normally and how they were designed to be taught*
- *The books at the library should all be online.*
- *Platforms that are safe should be used more (If I am not mistaken Zoom has some bad history and as we were doing lectures everyone could access before they changed it to private e-classes after a whole semester)*
- *I would kindly recommend institutions/universities to run mixed method (online and face to face teaching).*
- *I want to tell all the lecturers that knowledge is more important than teaching the course of study for students just to pass in the exam, no we really need real knowledge that helps us in our life and our work.*
- *Students know definitely which mode of study they prefer.*
- *I hope this pandemic teaches people how much we need each other.*

6 Conclusions, Limitations of Study, and Further Work

6.4 Summary of Findings

The Crisis Distance Education (CDE) that was foisted on HE institutions, students and academics across the world presented many challenges to the governments, educational institutions' leadership, staff (academic and support), and of course to the students, who have been the focus of the international research study presented in this paper. The sudden and rapid migration from traditional or hybrid (in some cases) to fully virtual, online education had considerable ramifications regarding the social, cultural, economic, political, ethical, and technical dimensions. Pre-existing social divides were exacerbated by the socio-digital divide. Pedagogical and psychological repercussions have already been faced and are expected to persist in the near future and in the long term.

Reports from the universities and countries of the authors show that much progress has been made since the initial outbreak of the COVID-19 pandemic. There was already an infrastructure and relevant knowhow mainly for hybrid education. The

Crisis or Emergency transition to a forced fully virtual model in most of the cases still poses challenges, especially for the students.

The effects of lockdowns on the students were widespread ranging from indifference, lack of motivation and cognitive disengagement.

There is an inherent difficulty in using the survey method for obtaining voluntary responses to a questionnaire which offers no incentives. Ensuring anonymity and non-traceability forbids collecting contact details. The questionnaire was very long and that was something that deterred students, many of whom reported to their professors/lecturers, who had pointed them to the online questionnaire; some abandoned the completion half-way through. The low response rate in many cases affected the originally intended, comparative analysis of data. Thus, cross-country comparisons were not statistically possible.

The overwhelming majority of the authors, professors and lecturers (who motivated their students to complete the questionnaire) come from the Engineering and Computing fields. They and their institutions had substantial experience in the use of technologies for e-learning. The students themselves are likely to also have familiarity and experience of online learning. As the data collected clustered around six axes we present below some important highlights from each of the six axes:

Demographics

A total of 1005 students (55% female. 43% male, 1% other, and 1% chose not to indicate) completed the questionnaire. The age of the sample participants ranged from 17 up to 59 years, while the majority were between 18 and 23 years old. This age distribution is expected for College and University students especially for those studying for their first degree. A small number of Masters and Doctoral students were among the respondents.

Facilities

Undoubtedly online education pre-supposes the availability and reliability of hardware and software, internet connect and uninterrupted power supply at the delivery end and at the students' own houses. This is not the case in many countries (e.g. Kenya and Nepal) or regions (e.g China). The unprecedented level of demand and high bandwidth exacerbates the problems of non-availability of high-speed Internet access.

In addition, most academics needed to familiarise themselves with the use of communication platforms, and also produce materials and record lectures as backup for asynchronous use especially by students without reliable connection to the internet.

Learning
The sudden migration to online learning overwhelmed the students and their lecturers. The changes happened very quickly and the danger of the pandemic started to be felt. Yet education had to continue.

The responses of the students showed some variations particularly where we were asking with all the changes that were happening. For example during the pandemic the daily engagement in self-study increased from 28% to 35%. In fact 60% of the students reported spending more time studying during the pandemic than before the pandemic.

Innovations used by the academics (such as animations, simulations, videos, as well as group work) alleviated anxiety and enhanced the engagement of their students, and improved the motivation of students to learn independently.

Communication
The questions in this section aimed to understand whether the students kept in touch with their lecturers, their fellow students, their family, and their friends**.** In addition to the anxiety felt by everybody because of the pandemic, studying from home meant distance from people, social isolation, anxiety, anger, confusion, even post-traumatic stress, increased time in front of screens and reduced physical activity. In some cases, students developed resilience to the challenges.

Many students sought technical help but also communication and company from their friends and fellow students.

Privacy and Security
The online international survey revealed considerable gaps in awareness and training about online privacy and cybersecurity issues. For example 65% (before the migration) and 70% (during the migration) of the respondents received no training at all about protecting their privacy and did not have awareness of cyber-security risks.

Additionally, the most significant outcome from this survey's questions that was highlighted by the adult and higher education students was the fact that almost 90% of them did not have any particular knowledge or training on cyber-crime, cyber-protection before or even during the Covid-19 pandemic. This can be seen in more details from the summarised information presented in section 3.5 and in extended reporting with a comprehensive list of proposals for future improvements in Berki et al. (2021) [94]. The latter can be found in this tome of conference proceedings.

6.5 Final Section prompting students for free text responses

As has been see the final section of the questionnaire was a totally open question prompting the students to provide to share their thoughts even after answering the lengthy part of the questionnaire with structured questions. This time they were free

to express their anxieties and problems and share their views and suggestions for improvement. Their responses were categorised in those that have embraced the move to virtual learning and teaching, those that are passionately longing for a return to the traditional face-to-face model, and those that opted for a mixed/hybrid model providing reasons and justifications for this choice. Finally, they provided suggestions for future improvement.

6.6 Looking towards the post COVID-19 era

This study involved a diversity of views and cultures from across the world. By sharing the collective experiences, knowledge, feelings, ideas, and suggestions for improvement the authors will contribute to the debate and to the improvement of the students' experiences. By proposing strategies for avoiding or at least alleviating the major problems caused by drastic events such as a pandemic the authors go a long way towards addressing issues or mitigating future disasters.

As there is a slow move towards a return to the on-campus teaching and learning, the lessons of 2020-2021 are carried with us. Many HE educators and students are now more technologically savvy than before – the digital pivot has equipped them with new skills, that they may choose to harness in the future. Blended or hybrid approaches to learning may become more common in the post-COVID period. However, the pandemic has also raised awareness of the deep inequalities that frequently exist in educational contexts, from technological, socio-economic, and socio-cultural perspectives. It is to be hoped that the disruption and loss caused by the coronavirus may, yet, be channelled towards an improved future educational landscape for all students.

Engaging in online learning exposes students to dangers regarding security and privacy, but also to false information. "In the post-truth era, everybody should be aware of the fact that certain individuals, organisations, agencies and even governments may generate misinformation, dis-information, or mal-information. Thus, awareness of the dangers of fake news, and the means of discerning the truth and credibility of information, are of paramount importance. By far the best strategy for dealing with these problems is the development of critical thinking and critical literacy as early as possible within formal education." [95].

The lack of preparedness by governments should not be a surprise. Donahue et al. [96] in 2014 established through extensive literature research that politicians under-invest in prevention because the electoral payoffs are higher for bringing in disaster funding through post-disaster declarations to provide help. The lessons learned from the COVID-19 pandemic show that on- going preparedness is and will continue to be necessary in order to save lives and livelihoods. In the case of education, preparedness will ensure that the education activity continues, and the quality of education is maintained or enhanced with on-going preparedness.

Finally, all stakeholders and society, the whole world indeed, need to develop mechanisms for ensuring future preparedness for dealing with disasters such as virus pandemics, but also for dealing with other disasters whether natural or manmade.

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8 References

1. UNESCO News, https://en.unesco.org/news/unesco-and-partners-launch-geneva-global-education-emergencies-hub (accessed 6.04.2021).
2. Georgiadou, Elli, Berki, Eleni, Valtanen, Juri, Siakas, Kerstin V., Rahanu, Harjinder, Edwards, J. Adam, Paltalidis, Nickos, Agouropoulos, Andreas, Hatzipanagos, Stylianos, McGuinness, Claire, Cavanagh, Jerald, Kirby, Padraig, Ojukwu, Dili, Savva, Andreas, Stylianou, Vasso, Plastira, Mary, Gevorgyan, Rita, Ross, Margaret, Staples, Geoff, Knezevic, Ratko, Čolic, Amela, Valkanou, Theodora, Siakas, Errikos, Deshappriya, Nelum, Zirki, Annita, Stoffová, Veronika, Lambrou, Georgia, Morales Calleja, Carlos, Stoffová, Maja, Panteri, Maria, Panteri, Valentina, Zamaraeva, Galina and Panov, Yuri (2020) *Challenges of rapid migration to fully virtual education in the age of the Corona virus pandemic: experiences from across the world.* Uhomoibhi, James, Dewar, Eleanor, Georgiadou, Elli, Linecar, Peter, Marchbank, Paul, Ross, Margaret and Staples, Geoff, eds. e-Learning as a solution during unprecedented times in the 21st century (INSPIRE 2020 Proceedings). In: Twenty Fifth International Conference on Software Process Improvement Research, Education and Training (INSPIRE XXV), 16 Jul 2020, Online. e-ISBN 9781999654948 (accessed 6.04.2021).
3. Oyedotun, T.D. (2020). Sudden change of pedagogy in education driven by COVID-19: Perspectives and evaluation from a developing country, *Research in Globalization,* 2, 100029, Elsevier, pp. 1-5.
4. Sutton, H. (2020) (ed). Keep your mission student-centered, even in the face of crisis. *Dean & Provost,* 21(10):12 Wiley Periodicals, DOI: 10.1002/dap
5. Nam, T. (2019). Understanding the gap between perceived threats to and preparedness for cybersecurity. *Technology in Society*, 58 101122.
6. World Bank. (2020). The World Bank Education Global Practice Guidance Note: Remote Learning & COVID-19, available at https://www.worldbank.org/en/topic/edutech #COVIDedtech (accessed 15.02.2021).

7. Ali, W. (2020). Online and remote learning in Higher Educationinstitutes: A necessity in light of COVID-19 pandemic. *Higher EducationStudies,* 10(3), 16–25.
8. Lily, A.E.A, Ismail, A.F., Abunasser, F.M, Alqahtani, R.H.A. (2020). Distance education as a response to pandemics: Coronavirus and Arab culture, *Technology in Society*, 63, Elsevier, https://doi.org/10.1016/j.techsoc.2020.101317
9. Aguilera-Hermida, A.P. (2020). College students' use and acceptance of emergency online learning due to COVID-19, International Journal of Educational Research Open 1, 100011, Elsevier.
10. Pragholapati, A. (2020). COVID-19 Impact on Students, Available at https://edarxiv.org/895ed/ (accessed 14.02.2021).
11. Carver, C.S. (1997). You want to measure coping but your protocol' too long: Consider the brief cope. *International Journal Behavioral Medicine,* 4, 92, https://doi.org/10.1207/s15327558ijbm0401_6 (accessed 6.04.2021).
12. Hamilton M. (1960). A rating scale for depression. *Journal of Neurological Neurosurgery Psychiatry*, 23:56–62
13. WHO (2020) World Health Organisation announces COVID-19 outbreak a pandemic https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/news/news/2020/3/who-announces-covid-19-outbreak-a-pandemic.
14. Cao, W., Fang, Z., Hou, G., Han, M., Xu, X., Dong, J. (2020). The psychological impact of the COVID-19 epidemic on college students in China," *Psychiatry Res.*, vol. 287, no. March, p. 112934, 2020
15. Mishra, L., Gupta, T., Shree, A. (2020). Online teaching-learning in Higher Educationduring lockdown period of COVID-19 pandemic, International Journal of Educational Research Open, 100012
16. Johnson, B., & Christensen, L. (2012). Educational research: Quantitative, qualitative and mixed approaches (4 ed.). Thousand Oaks, California: Sage Publications.
17. Speck, M. (1996). The change process in a school learning community. *The School Community Journal*, 6 (1): 69–79.
18. Kress, M.., (n.d.), Principals Without a Playbook: Leadership Amid the PandemicHow school leaders are working to support their students and teachers and keep learning going while schools are closed because of the Corona Virus. https://www.teachforamerica.org/stories/principals-without-a-playbook-leadership-amid-the-pandemic (Accessed: 21/01/2021)
19. The Impact of Corona Virus on Higher Educationin Germany (2020) https://www.studying-in-germany.org/the-impact-of-CoronaVirus-on-higher-education-in-germany/ (Accessed: 21.01.2021)
20. Coronavirus: What Can German Universities Do for International Students (2020) https://www.studying-in-germany.org/coronavirus-what-can-german-universities-do-for-international-students/ (Accessed: 21.01.2021)
21. Hussain, T., (2020). Education and COVID-19 in Nigeria: tackling the digital divide. Found at: https://www.soas.ac.uk/blogs/study/COVID-19-nigeria-digital-divide/. (Accessed: 27.01.2020).

22. WLF, (2020). Education and COVID-19 in Nigeria: Tackling the Digital Divide. Published at: https://worldliteracyfoundation.org/education-and-COVID-19-in-nigeria/. (Accessed: 16.06.2020).
23. Education: From disruption to recovery (2020), OECD Policy Responses to Corona Virus (COVID-19), https://en.unesco.org/COVID19/educationresponse, (Accessed: 27.01.2021)
24. Bandara, I., Ioras, F., Maher, K. (2014). Cyber Security concerns in e-Learning Education. Proceedings of ICERI 2014 Conference, 17th-19th November, Seville, Spain, pp. 0728 – 0734.
25. Anghel, M., & Perețeanu, G.C. (2020). Cyber security approaches in e-learning. Proceedings of INTED2020 Conference, 2nd-4th March, Valencia, Spain, pp. 4820-4825.
26. ENISA Threat Landscape Report (2020). List of 15 threats. https://www.enisa.europa.eu/topics/threat-risk-management/threats-and-trends, (accessed 6.04.2021).
27. European Commission, "Data protection under GDPR", available online at: https://europa.eu/youreurope/business/dealing-with-customers/data-protection/data-protectiongdpr/indexamp_en.htm (accessed 6.04.2021).
28. Kleinberg, H., Reinicke, B., Cummings, J. (2015). Cyber Security Best Practices: What to do? *Journal of Information Systems Applied Research, 8*(2), 52-59.
29. Tunggal, "The 56 Biggest Data Breaches (Updated for 2021)," UpGuard, https://www.upguard.com/blog/biggest-data-breaches, (30.4.2021).
30. Securelist by Kaspesky, "Digital Education: The cyber-risks of the online classroom" https://securelist.com/digital-education-the-cyberrisks-of-the-online-classroom/98380/ , (accessed 6.04.2021).
31. Price, D. "Is Zoom Safe to Use? 6 Privacy Issues to Consider," MUD, https://www.makeuseof.com/is-zoom-safe/, (accessed 21.11. 2020).
32. Odusanya, M. "Top 8 Microsoft Teams security issues," INFOSEC, 10.3.2021. https://resources.infosecinstitute.com/topic/top-8-microsoft-teams-security-issues/. (Accessed 6.04.2021).
33. Chaudhary, S., Schafeitel-Tähtinen, T., Helenius, M., Berki, E. (2019). Usability, Security and Trust in Password Managers: A Quest for User-Centric Properties and Features. *P. 69-90, Computer Science Review. Elsevier. Vol 33,*. https://doi.org/10.1016/j.cosrev.2019.03.002 (accessed 6.04.2021).
34. Chaudhary, S., Berki, E., Li, L., Valtanen, J. (2015): Time up for phishing with effective anti-phishing research strategies. *International Journal of Human Capital and Information Technology Professionals (IJHCITP) 6(2)*. http://www.igi-global.com/gateway/article/128310 (accessed 6.04.2021).
35. Li, L., Berki, E., Helenius, M., Ovaska, S. (2013). Towards a contingency approach with whitelist- and blacklist-based anti-phishing applications: what do usability tests indicate? *Behaviour and Information Technology, BIT Vol 33, No 11, pp* 1136-1147. (10.1080/0144929X.2013.875221).
36. EAIE 2021 Virtual Conference and Exhibition https://www.eaie.org/ [Accessed: 27/04/2021].
37. NAS RA, International Scientific Center, https://www.isec.am/en/admissions/online-education (Accessed: 27.04.2021).

38. Gevorgyan, R. Enhancing the Quality of the Teaching and Learning Process Though the Implementation of E-Learning Tools *(Armenian State Pedagogical University Kh. Abovyan, Armenia)* . e-Learning as a solution during unprecedented times in the 21st century (INSPIRE 2020 Proceedings). In: Twenty Fifth International Conference on Software Process Improvement Research, Education and Training (INSPIRE XXV), 16 Jul 2020, Online. e-ISBN 9781999654948. https://www.researchgate.net/publication/348169750_Challenges_of_Rapid_Migration_to_Fully_Virtual_Education_in_the_Age_of_the_Corona_Virus_Pandemic_Experiences_from_Across_the_World (accessed 6.4.2021).
39. Armenia Statae Finace https://finance.aspu.am/ (accessed 6.4.2021).
40. Popa, D., Knezevic, R. "Academic Mobility Polices in Higher Education of Bosnia and Herzegovina" https://www.researchgate.net/publication/32618965 , (accessed 6.4.2021).
41. UNESCO. (2020). Education: From disruption to recovery. Retrieved 23 February 2021, from: https://en.unesco.org/COVID19/educationresponse (accessed 23.02.2021).
42. COVID-19 International Student Well-being Study. 2020. Autumn. https://www.uantwerpen.be/en/research-groups/centre-population-family-health/research2/COVID-19-internation/(accessed 6.4.2021).
43. Berki, E. Reflections on e-Learning in the Time of Coronavirus: The Nordic Experience and Ethical Considerations - Back to the Future with The e-Learners Manifesto. In Proceedings of the 25th Annual INSPIRE Conference; Uhomoibhi, J., Dewar, E., Georgiadou, E., Linecar, P., Marchbank, P., Ross, M., Staples, G., Eds.; 2020; pp. 21–52. https://www.bcs.org/media/6602/inspire-2020-proceedings.pdf. (accessed 6.4.2021).
44. Chaudhary, S.; Zhao, Y.; Berki, E.; Valtanen, J.; Li, L.; Helenius, M.; Mystakidis, S. A Cross-Cultural and Gender-Based Perspective for Online Security: Exploring Knowledge, Skills and Attitudes of Higher Education Students. *IADIS Int. J. WWW/Internet* **2015**, *13*. http://www.iadisportal.org/ijwi/papers/2015131105.pdf , (accessed 6.4.2021).
45. Berki, E., Kandel, C. S., Zhao, Y., , Chaudhary, S.. A Comparative Study of Cyber-Security Knowledge in Higher Education Institutes of Five Countries, EDULEARN17 Conference, Barcelona, Spain, 2017. http://lib.uib.kz/edulearn17/proceedings/papers/1591.pdf. (accessed 6.4.2021).
46. Ohisalo, M. (Minister of Internal Affairs, Finland). Comprehensive assessment of safety and security in sparsely populated areas Ministry of the Interior, Finland, 23.10.2020 9.02. Press release 127/2020 https://pelastustoimi.fi/en/-/1410869/comprehensive-assessment-of-safety-and-security-in-sparsely-populated-areas, (accessed 6.4.2021).
47. Eshet, Y. (2007). Teaching online: survival skills for the effective teacher. ACM SIGCSE Bulletin, 39(2), 16-18.
48. Koutsogiannis, D. (2007a). A political multi-layered approach to researching children's digital literacy practices. Language and Education, 21(3), 216-231.

49. Koutsogiannis, D. (2007b). Exploitation of Information and Communication Technologies in the teaching of literary courses and especially in the Greek language teaching. Research on the philologists trained in the Odyssey project. Thessaloniki: Greek Language Center [In Greek].
50. Koutsogiannis, D. (2011). Adolescents' Digital literacy practices and (language) education. Thessaloniki: Greek Language Center [In Greek].
51. Photodentro, http://photodentro.edu.gr/lor/ (accessed 6.4.2021).
52. Digital school, https://dschool.edu.gr/ (accessed 6.4.2021).
53. Digital platform, "e-me" https://auth.e-me.edu.gr (accessed 6.4.2021).
54. Platform "Aesop", http://aesop.iep.edu.gr/ (accessed 6.4.2021).
55. State television channel ERT, https://webtv.ert.gr/category/mathainoume-sto-spiti/, (accessed 6.4.2021).
56. Tzifopoulos, M. (2019). Teacher education for the digitally oriented school: the curricula of the Schools of Primary Education in Greece. Proceedings of the 11th PanHellenic Conference of the Hellenic Pedagogical Society on "Basic and adult education of teachers in a complex and changing environment", Patra, November 23-25, 2018, pp. 460-471 [In Greek].
57. Tzifopoulos, M., & Bikos, K. (2016). Are kindergarten pre-service teachers trained with ICT? The curricula of the Schools of Early Childhood Education in Greece. Educational Review, 33(61), 133-153 [In Greek].
58. Seferis, G. (1942) , An Old Man On The River Bank from "Mythistorema" from Collected Poems (George Seferis). Translated, edited, and introduced by Edmund Keeley and Philip Sherrard. Copyright © 1995 by George Seferis. Reprinted by permission of Princeton University Press (1995).
59. O'Brien, C. (2021, January 19). 'Students get almost 17,000 laptops in online learning scheme.' *Irish Times*. https://www.irishtimes.com/business/work/students-get-almost-17-000-laptops-in-online-learning-scheme-1.4461321 (accessed 6.4.2021).
60. All Ireland Journal of Higher Education, https://www.aishe.org/aishe/journal/ (accessed 6.4.2021).
61. Irish Universities Association (2020) *Enhancing Digital Teaching & Learning in Irish Universities.* https://edtl.blog/ (accessed 6.4.2021).
62. EDTL Approach for Students: planning for effective learning during Covid-19, https://ulsites.ul.ie/itd/sites/default/files/itd_edtl_student_infographic.pdf (accessed 6.4.2021).
63. Hassan, O. et al (2020). Supporting Student Engagement and Partnership in Higher Education Decision-Making during the Pandemic: A reflection from the National Student Engagement Programme (NStEP). *All Ireland Journal of Higher Education, 12* (3). https://ojs.aishe.org/index.php/aishe-j/article/view/545 (accessed 6.4.2021).
64. Abdillahi, U. A. (2020) Use of Electronic Resources by Postgraduate Students during COVID-19 Pandemic: Case of Masinde Muliro University of Science and Technology, In Kenya. World Journal of Innovative Research. (WJIR), ISSN:2454-8236, Volume-9, Issue-5, PP 62-66

65. Liew, C. L., Foo, S., & Chennupati, K. R. (2000). A study of graduate student end users' use and perception of electronic journals. *Online Information Review*.
66. Tenopir, C. (2003), Use and Users of Electronic Library Resources: An Overview and Analysis of Recent Research Studies, available at: www.clir.org/pubs/reports/pub120/pub120.pdf. (accessed 6.4.2021).
67. El-Mansour, B. (2011). Institutional challenges facing online Education. Education in a technological world: Communicating current and emerging research and technological efforts A. Méndez-Vilas (Ed.) pp266-269
68. Tarus, J. (2011). Adoption of E-learning to Support Teaching and Learning in Moi University, MPhil Thesis (Information Technology), Moi University, Kenya.4
69. Tarus, J., Gichoya, D., & Muumbo, A. (2015). Challenges of implementing elearning in Kenya: A case of Kenyan public universities. The International Review of Research in Open and Distributed Learning, 16(1).
70. Mutisya,D.N. & Makokha,G.L (2016). Challenges affecting adoption of elearning in public universities in Kenya. E-Learning and Digital Media 2016, Vol. 13(3–4) 140–157
71. University Grant Commission, https://www.ugcnepal.edu.np/frontpage/21. (accessed 6.4.2021).
72. World Education Services, "Education in Nepal," https://wenr.wes.org/2018/04/education-in-nepal. (accessed 6.4.2021).
73. Edusanjal, "Notice Regarding Online Education from Tribhuvan University," https://edusanjal.com/news/notice-regarding-online-education-tribhuvan-university/. (accessed 6.4.2021).
74. Kathmandu University School of Education, "Guidelines for Online Teaching and Learning," *http://soe.kusoed.edu.np/guidelines-for-online-teaching-and-learning/.* (accessed 6.4.2021).
75. A. A. e. al., "Internet-based Online Higher Education in Nepal admist COVID-19," *https://edarxiv.org/r85bc/.* (accessed 6.4.2021).
76. D. G. a. P. Gautam, "Transition to online higher education during COVID-19 pandemic: turmoil and way forward to developing country of South Asia-Nepal, J*ournal of Research in Innovative,* vol. 14, no. 1, pp. 93-111, 2021
77. Brooks, S., B. Rebecca K Webster, R. K.., Smith, L.E., Woodland, L, Wessely, S., Greenberg, N., Rubin, G. J., (2020) The psychological impact of quarantine and how to reduce it: rapid review of the evidence, The Lancet, 2020. 26.02.2020.
78. Lessons of the Stress-Test: Higher Educational Institutions in the Pandemic and after it. Analytical Report. Moscow. Ministry of Science and Higher Education. 2 June 2020. https://drive.google.com/file/d/1GMcBIoP8ITzE_WDVh4nFksX6lceotZY3/view (accessed 6.4.2021).
79. Czakóová,K, Stoffová,V.. Training teachers of computer science for teaching algorithmization and programming. In: IMSCI '20 : the 14th International Multi-Conference on Society, Cybernetics and Informatics. - [1. vyd.]. - Winter Garden: IIIS -International Institute of Informatics and Systemics, 2020. - ISBN 978-1-950492-46-6. - S. 231-235.

80. Hyksová,H. Stoffová,V. Teaching practically oriented subjects in a distance form In:ICERI2020 : 13th international conference of education, research and innovation :9th-10th November2020 :conference proceedings.-ISSN2340-1095.-[1.vyd.].-Valencia:IATEDAcademy,2020.-ISBN 978-84-09-24232-0.-p.6387-6396. (accessed 6.4.2021).
81. Burns, D. S, Dagnall, N., Holt, M. (2020). Assessing the impact of the COVID-19 pandemic on students' wellbeing at universities in the UK: a conceptual analysis. *Front. Educ., 5*, 204. doi:10.3389/feduc.2020.582882 (accessed 6.4.2021).
82. Stone, E. J. (2012). A Vygotskian Commentary on the Reggio Emilia Approach. *Contemporary Issues in Early Childhood, 13*(4), 276- 289. http://dx.doi.org/10.2304/ciec.2012.13.4.276 (accessed 6.4.2021).
83. Vygotsky, L.S. (1990). Imagination and Creativity in Childhood. *Journal of Russian and East European Psychology, 28*(1), 84-96. http://dx.doi.org/10.2753/RPO1061-0405280184 (accessed 6.4.2021).
84. Pisano, L.; Galimi, D.; Cerniglia L. A qualitative report on exploratory data on the possible emotional/behavioral correlates of COVID-19 lockdown in 4–10 years children in Italy. 2020. [Preprint] PsyArXiv. Available from: https://psyarxiv.com/stwbn (accessed 6.4.2021).
85. Callahan, J.L. (2020). Introduction to the special issue on telepsychotherapy in the age of COVID-19. *Journal of Psychotherapy Integration, 30*, 155–159. https://doi.org/10.1037/int0000231 (accessed 6.4.2021).
86. Farmer, R., McGill, R., Dombrowski, C. S., Benson, F. N., Smith-Kellen, S., Lockwood, A. B., Powell, S., & Stinnett, A. T. (2021). Conducting psychoeducational assessments during the COVID-19 Crisis: the danger of good intentions. *Contemporary School Psychology, 25*, 27–32. https://doi.org/10.1007/s40688-020-00293-x (accessed 6.4.2021).
87. Humphreys, K. L., Myint, M. T., Zeanah, C. H. (2020). Increased Risk for Family Violence during the COVID-19 Pandemic. *Pediatrics, 146* (1), 1-5.
88. Golberstein, E., Wen, H., Miller, B.F. (2020). Coronavirus Disease 2019 (COVID-19) and Mental Health for Children and Adolescents. *JAMA Pediatrics, 174*, p.819.
89. YÖK. Basın Açıklaması. Retrieval address: https://www.yok.gov.tr/Sayfalar/Haberler/2020/universitelerde-uygulanacak-uzaktan-egitime-iliskin-aciklama.aspx. (accessed 6.4.2021).
90. UK Government Publication, https://www.gov.uk/government/publications/higher-education-reopening-buildings-and-campuses/higher-education-reopening-buildings-and-campuses (accessed 6.4.2021).
91. Middlesex University https://www.mdx.ac.uk/study-with-us/autumn-2020-coronavirus (accessed 6.4.2021).
92. Miller, C. (2021, March 14). Online Education Statistics. Retrieved from https://educationdata.org/online-education-statistics (accessed 6.4.2021).
93. Mystakidis S, Berki E, Valtanen J (2021), Deep and meaningful e-learning with social virtual reality environments in higher education: A systematic review, Applied Sciences, 11 (5) (open access).

94. Berki E, Chaudhary S, Panteri M, Valkanou T, Valtanen J-P, Bamford J, Zolotavkin Y, Plevraki A, Li L, Holcombe M, Staples G. Guidelines and Multidisciplinary Knowledge Advice for Cyber Protection in e-Learning: Hey, Teachers! Don't Leave the Kids Alone Online! e-Proceedings of Ross M et al. (Eds) INSPIRE 2021 Online International Conference 21-23.6.2021 (this tome of the conference e-proceedings).
95. Georgiadou, Elli, Rahanu, Harjinder, Siakas, Kerstin V., McGuinness, Claire, Edwards, J. Adam, Hill, Vanessa, Khan, Nawaz, Kirby, Padraig, Cavanagh, Jerald and Knezevic, Ratko (2018) Fake news and critical thinking in information evaluation. WBILC2018 - Proceedings International Scientific Conference "Western Balkan Information Literacy": Alternative facts, Fake News, getting to the truth with Information Literacy, 21-22 June 2018. In: Western Balkan Information Literacy Conference WBILC 2018, 21-22 June 2018, Bihac, Bosnia and Herzegovina. ISBN 9780954158279.
96. Donahue, A.K., Eckel, C. C., Wilson, R.K. (2014) Ready or Not? How Citizens and Public Officials Perceive Risk and Preparedness, The American 332 Review of Public Administration, Sage Journals, Vol. 44, Issue 4_suppl, page(s): 89S-111S.