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Using Mixed Methods to Understand Teaching and Learning in COVID 19 Times

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Abstract: This research focuses on teaching–learning behavior in the online environment under crisis conditions, such as those caused by COVID-19. Data were collected from 427 participants from Central and Eastern Europe and North and Central Asia. An integrative mixed method design was used, combining components of both qualitative and quantitative research. The research method used was the inquiry based on a semi-structured questionnaire, which combined closed items with open-ended and semi-structured interviews. The quantitative results revealed significant differences between professors and students regarding the self-reported adaptability level, creativity, need for help in online teaching–learning, and collaboration with colleagues for solving problems in the online teaching–learning medium. The opinions of professors do not differ from those of students regarding the advantages, disadvantages, vulnerable areas, and aspects of online education. Thematic analysis, used to analyze the qualitative data, emphasized the participants' perceptions of online teaching–learning efficiency in crises. Based on the results, it was concluded that the aspects that need to become a priority in online education concern mainly the didactic quality of the learning experience.

Keywords: online learning; mixed methods design; digital competencies; personality traits; didactic skills

1. Introduction

Specialists consider that there is almost no face-to-face university teaching anymore [1], as most universities offer students online platforms where curricular materials are posted, not only for students enrolled in distance learning programs but also for full-time students.

Statistics regarding Internet users around the world [2] show us the impact rate on the population. From data provided by respondents to our questionnaire, Estonia has the highest percentage—97.9, followed by Germany—96, Croatia—91.5, Hungary—89, Russia—80.8, Bosnia and Herzegovina—80.8, Kazakhstan—78.1, Moldova—76.1, Romania—73.8, followed by Armenia—71.8, Montenegro—71.5, Georgia—66.6, and Uzbekistan—51.3. The average impact rate of the 13 countries is 78.8%. The distribution of this coefficient is typical for these countries; Romania, the country with most respondents, draws near the average.

The beginning of the 21st century challenged universities to integrate more and more online learning into their curricula, understanding the learning opportunities that these create. To ensure

efficient online teaching, a few conditions are to be met: a good connection to the Internet, high-quality equipment, and specialized and IT training of professors [3]. Besides technical conditions and those related to professors' training, students who participate in online courses display satisfaction needs and dissatisfaction [4] that need to be taken into account when designing courses. The university level of discipline was considered by students as a positive predictor of the degree of innovation for online learning [5].

The literature abounds in studies that try to develop models for online teaching [6–8]. Synthesizing principles and relevant training models, Reeves & Reeves [9] propose five essential strategies in the design and online teaching process: observing the grounds of efficient teaching–learning; maximizing the synchronization of essential elements of the learning environment (objectives, content, training model, tasks, roles of the participants, and assessment); maintaining cognitive, social, and teaching presence; gradual introduction of new technologies; and formative and continuous assessment of the formation experience to improve it.

From the transformative learning theory [10], students must be supported in becoming autonomous in their development process and fulfilling their potential. Transformative learning theory refers to the way in which young people and adults learn. In essence, this theory stipulates that the system of reporting to the world changes through the critical judgment of new information. Merizow assumes that learners not only store knowledge, but the unique aspects learned allow the formation of previously unexplored perspectives that lead to independent thinking and a deep understanding, influencing personal beliefs. Transformative learning has as essential elements instrumental and communicative acquirements. The instrumental one allows the evaluation of causal links in problem-solving. Communicative learning refers to how emotional aspects related to new information are communicated. Through self-reflection, self-directed learning, and critical thinking, learners can dispute those conceptual systems which they formed in the previous development period. Thus, aspects such as "critical reflection, awareness of frames of reference, and participation in discourse" represent essential elements of an efficient pedagogic act [11], p. 11.

In order for professors to form students in this spirit, they need to reflect on the development level of their competencies and their need for personal development to be real agents of social change. Adaptability, collaboration with others, and critical reflection are personality characteristics that play an essential role in this process.

Online learning and, implicitly, online teaching came to complete traditional face-to-face teaching. We do not see a fight for supremacy but a "win-win" negotiation. Thus, in teaching foreign languages, face-to-face teaching could be more beneficial for practical learning based on tasks as compared to computer learning [12]. Nevertheless, after students evaluated them, professors teaching face-to-face courses received slightly more unsatisfactory grades than their colleagues teaching online [13]. The research results on Chinese writing indicate that both media (face-to-face and online chat) have presented benefits in preparing students. The two media facilitated their interactive sessions in different ways, answering students' needs [14].

Online education extends the access of students, facilitating preparation in different fields. Online courses offer students many advantages: flexible timetables, eliminating time spent physically changing location, stimulating interaction between students and professors [15], and less stress [16]. For medical students, online teaching of anatomy was well-received and enjoyed, especially in the form of video conferences and personalized online resources [17–19]. Video conferencing presents an opportunity to avoid logistical challenges in scheduling courses, and it can be implemented as a co-curricular activity, avoiding the necessity to revise courses [20]. Remaining in the medical world, when teaching embryology online, students appreciated the format of the page and the design of the virtual class [21]. Passing to the world of sport, a multimedia intelligent teaching system for sports yields improvements for physical education professors [22].

A few disadvantages of online courses for students include a sensation of isolation, adaptation difficulties, and self-discipline necessary for regular consultation of online course materials and

assignments [23]. Traits including gender, address, results of the admission test, previous reading of online courses, and course size can influence the enrolment either for day courses or those online, and the linear regression models have indicated that the marks of students were slightly lower for online courses as compared to those for face-to-face ones [24].

Metacognition plays an important part in online learning. Students in face-to-face education were assessed as having a higher awareness of social metacognition, although the metacognitive awareness scores were similar [25]. In teaching managerial accounting, the tendency is to orient towards online courses. The regression analysis for examining this issue has shown that results are more insufficient for online classes than face-to-face classes [26].

With an increasing number of students enrolled in online courses, universities must identify what efficient online teaching is, and professional dispositions can make a professor efficient online. Professional dispositions are defined as those attitudes, values, and professional beliefs exemplified both by verbal and non-verbal behaviors, influenced by beliefs and attitudes related to values, such as care, correctness, and honor [3]. The experience of online teaching has influenced the thought, planning, and teaching methods of professors [27]. For successful and sustainable online teaching, professors re-design the course and improve their teaching abilities [28]. To achieve the desired learning aims, the teaching act is considered more important than social and cognitive presence [29].

In a study on students' adaptability, results have shown that students used technology as a portal of knowledge, where they can store and share documents, access materials, courses, visualize announcements, and send homework. The availability of online information motivates students to learn new concepts and, therefore, to use independent and sustainable learning. The professors share information, collaborate, and interact online by using chat, messages, video calls, and e-mails. Nevertheless, irrelevant information on social media, such as spam, advertising, and negative posts, tend to distract attention [30].

Regarding professors' adaptability, it was noted that this correlates positively with work implication and in a negative manner with work insecurity, the latter partially mediating the relationship between adaptability and work engagement. Moreover, the engagement capacity moderated the relationship between adaptability and work insecurity. When they face the same situation and work-related stress, online professors who have a higher adaptability level will be more involved in the work with lower insecurity [31].

The main objections raised by students were: (1) a lack of flexibility of the schedule in a hybrid format; (2) technical difficulties both for hybrid and online deliveries; (3) a lack of interaction with other students and trainers in an online format; (4) a lack of possibility of receiving feedback immediately in an online format; (5) a lack of the feeling of belonging to a community in the online format; and (6) a lack of learning efficiency because of complicated communication processes [32]. Online learning media require students to work independently without a trainer's help in a face-to-face traditional course format. Besides this, students have to efficiently use time management skills to meet deadlines and foresee future exams and tasks [33].

The most frequent forms of organization of university courses are "lightly blended or hybrid courses". Blended learning is an educational approach that offers a mixed learning environment; face-to-face lectures can be complemented with learning material offered in various online formats. Some researchers state that mixed learning is more efficient than using face-to-face educational modalities [34,35] if the course material is designed and presented according to sound pedagogic principles [36]. Mixed learning implies a series of challenges: self-regulation challenges and those of learning technology for students, threats regarding the use of technology for teaching, in the case of professors, and those regarding the provision of training technology adequate for education institutions [37]. It was noted that learning benefits are comparable in face-to-face and online versions of a course, but students' satisfaction differs, suggesting possible ways of integrating successful elements of the online in a combined (mixed) approach [38]. Face-to-face learning can be mediated and improved through collaborative learning media based on a web camera. Thus, platforms are essential

in collaborative learning through e-learning and for completing face-to-face education. They offer the possibility of attending courses, accessing necessary learning resources, and completing assignments set by professors [39]. The efficiency of courses that combine face-to-face and online is disputed in the literature. Some studies note that they have improved the results of learning, while others do not. These uncertain results could be due to inconsistent definitions of these courses [40].

Academic practices that refer to hybrid courses should reflect on the following: interactions of professors with technology, academic assignments; institutional environment; interactions with students; attitudes and beliefs of a professor on teaching; and opportunities for professional development and sustainable education [41]. Academic program designers should develop strategies for helping students to be successful through identifying personal characteristics, situational variables, and academic factors that characterize and foresee academic performance [42]. In the particular context given by the education crisis caused by the new pandemic, by the necessity of moving to online learning, in crisis conditions, the concept of "pedagogic continuity" receives resonance and weight. This fact supposes a deliberate organization of didactic efforts to preserve a considerable connection, with significances and purpose between professors and students. At a minimal level, documents are offered, and information essential for the didactic process is conveyed. Nevertheless, is this effort enough? Will education systems manage to put it into practice, preserve their functionality, and reach their ends? Are university professors and students prepared enough for this type of teaching? What are their reactions to this teaching–learning medium?

The previous research results point out that online teaching can be an efficient alternative, which fulfils several criteria, such as curriculum development and innovation, efforts to ensure the viability of online courses, continual evaluation for improvement purposes, and development of teachers' digital skills [43,44]. The literature review indicated that online teaching is not protected from criticism, only that in certain conditions, it can prove to be a viable alternative to face-to-face teaching [45,46]. However, the context in which online teaching is the only possible option, in which all education agents are obliged to function, was not studied. Transformative learning theory is one of the theoretical bases of this article and the choice of research methods. We wanted to find out how both students and teachers relate to the new context, what "truths" in the conceptual system are shaken because of the context of the crisis and the use of an alternative learning environment. We sought to discover if the formative valences of online learning affect the conceptual system of educational actors.

This research investigates the online medium's teaching–learning behavior under crisis conditions, such as that caused by COVID-19. In all countries where the research was conducted, measures were taken to prevent COVID 19 infection during the beginning of the pandemic. Thus, face-to-face courses were suspended, and then the mixture of digital and classroom teaching was changed. The laboratories took place in small groups, face-to-face, keeping the social distance. Some examinations were conducted face-to-face in small groups, respecting prevention measures; others were conducted online. This study attempts to answer questions such as:

(1) How do education agents relate to online teaching in crisis conditions?
(2) Are there different opinions among professors and students regarding the advantages, disadvantages, vulnerable areas, and the aspects that can be improved?

2. Materials and Methods

We used an integrative mixed method design [47] or a "hybrid" design [48], combining components of both qualitative and quantitative research. We chose this type of design using inductive and deductive reasoning techniques to describe and explain the investigated phenomenon as fully as possible, from several perspectives. This model integrated data both in the collection process and the analysis. The type of design chosen uses diverse designs from mixed methods, in different stages of the research. Thus, we started with a convergent, concurrent/embedded design, as the inquiry was based on a semi-structured questionnaire which combines closed items with open-ended items. We continued

with a sequential design, applying semi-structured interviews. The theoretical perspective was implicit, using the transformative learning theory.

The core component was the qualitative part (open items in the questionnaire and interviews), and the quantitative data from the survey represented the additional components. Qualitative methods were designed to assess the online teaching–learning processes, and the online teaching–learning outcomes were assessed by quantitative methods [49].

Quantitative hypothesis:

1. In online learning, are there statistically significant differences between professors and students regarding the self-reported adaptability and creativity levels, the need for help in online teaching–learning, and the collaboration with colleagues for solving problems?
2. Are there significant differences between professors and students regarding the relationship with the online learning medium?
3. Are there significant differences between the respondents depending on age regarding the online learning medium's relationship?

The qualitative research objective was to explore students' and professors' opinions about online teaching and learning. The qualitative research questions for the qualitative inquiry are:

What works in online teaching–learning as it is now?

What does not work in online teaching–learning as it is now?

What should be improved in online teaching–learning practice?

The mixed methods questions were as follows: How did the combination of survey research and in-depth interviews provide a more comprehensive understanding of teachers' and students' attitudes about online teaching and learning? Are there different opinions among professors and students regarding the advantages, disadvantages, vulnerable areas, and the aspects that can be improved?

2.1. Participants

The sample for the questionnaire consisted of 427 participants (111 male). The ages ranged from 19 to 75 years old (Table A1: Sociodemographic characteristics of respondents). The most represented age category (19 to 30 years old) comprised 205 respondents, representing 48% of the total number of participants. The majority of respondents were from urban areas (76.8%). The sample consisted of 205 professors (48%) and 222 students (52%). The participants were recruited online through e-mails and social media groups. They were citizens from Central and Eastern Europe and North and Central Asia, from the following countries: Armenia (3%), Bosnia and Herzegovina (3%), Croatia (4.9%), Estonia (2.8%), Georgia (3%), Germany (2.8%), Hungary (6.1%), Kazakhstan (4.9%), Republic of Moldova (6.6%), Montenegro (4.4%), Romania (37.0%), Russia (6.6%), Tajikistan (3.5%), Turkey (4.4%), and Uzbekistan (6.8%). The country with the most respondents, 158, was Romania. The informed consent was considered implicit.

After the participants read the information that preceded the research tool, they could participate in the research or not. In this information, the purposes, variables of the research, and participants' rights were explained to them. The participants could stop at any time, without their data being stored. Moreover, the participants were assured of the anonymity of the answers and the confidentiality of the data. The participants in the interview were ten professors and ten students. The ages ranged from 20 to 62 years old. Equal representation by sex was ensured (ten women and ten men), from different fields of study: Engineering (4), Social Science (4), Art (2), Medicine (4), Economics (4), and Mathematics-Informatics (2), and from different countries: Romania (4), Germany (2), Kazakhstan (2), Moldova (2), Tajikistan (2), Turkey (2), Uzbekistan (2), Armenia (1), Bosnia and Herzegovina (1), Georgia (1), Hungary (1). Almost half of the interviews were conducted in Romanian (8 participants from Romania, Moldova, Germany) and the others in English.

The research received the Ethics Commission's approval in social research from Transilvania University of Brasov, Romania.

2.2. Measures

The data were collected during 25–29 March 2020 and 8–18 April 2020. The questionnaire was self-applied. The respondents received a link on SurveyMonkey.com, preceded by informed consent. Completing the questionnaire lasted six minutes on average. The sampling method was maximum variation and inclusion/exclusion criteria. We wished that representativeness be ensured by the following criteria: status (professor or student), age, study field, location (urban, rural), and country. Initially, 480 questionnaires were collected; we eliminated those that were not filled in completely. The interviews were applied after the analysis of data obtained from the questionnaire. They were carried out by telephone and online communication sites (Zoom, Skype, and WhatsApp).

2.3. Description of the Questionnaire

The questionnaire comprised 17 items, out of which six items were closed, four items used a Likert interval scale ranging from 1 (the lowest) to 5 (the highest), and seven were open-ended items. Closed items aimed at obtaining sociodemographic data (country, age, gender, status, study domain, and area). Items on the interval scale aimed at self-reporting of the participants for the following characteristics: adaptability level, creativity level; the level of help necessary in online teaching–learning; and level of collaboration with colleagues in solving a problem related to online teaching–learning. Open-ended response items were aimed at aspects, such as what works in online teaching; what does not work in online teaching as it is now; what should be improved; do teachers change the online methods as they discover some gaps in learning; do you change the online methods as you discover some gaps in students' learning; do you think that the traditional face to face approach can be replaced with online teaching and learning; why? Answers to open-ended items were analyzed qualitatively, recoded depending on the theme, and analyzed concerning the other answers.

2.4. Description of the Interview

The research team drew up a list of participants from the first research stage; it was coded, divided into subgroups by the criteria: student/professor and gender: male/female. Using the cluster sampling technique, we selected 20 people to whom the invitation to participate in the interview was sent. Semi-structured interviews were recorded, respondents giving their agreement to participate in the research, and recorded interviews. Interviews were held for 20 to 50 min, with an average interview time of 30 min. All participants answered voluntarily; they did not receive any compensation or payment. The research received the approval of the Ethics Commission in social research from the Transilvania University of Brasov.

The interview grid contained three sections (functional aspects, those relating to problems, and those relating to potential improvements in online education), comprising 12 questions, which consider thoroughly the themes expressed by the items used in the questionnaire, adding the possibility that the respondents complete the discussions with their points of view and new perspectives, not previously anticipated by the research team. Qualitative data were analyzed through thematic analysis [50] in order to discover the main categories. Interviews were transcribed and coded [51] to highlight the most salient variables related to the participants' perceptions of online education in the crisis period. The relationships between these variables were explored. Both the coding of and interrelationships between the categories were carried out by two researchers, independently of one another. A third author revised the end-product of the analysis group.

2.5. Statistical Analyses

All statistical analyses were calculated using IBM SPSS Statistics 21. For score variables, statistical tests for comparing averages were used, such as the independent sample T-test. Measurements of association (χ^2 test) were applied for the nominal, categorical variables.

3. Results

3.1. Quantitative Research

3.1.1. Differences between Professors and Students in Adaptability, Creativity, the Need for Help, and Collaboration with Colleagues

To check if the self-reported level of adaptability and creativity, the need for help in online teaching–learning, and collaboration with colleagues for solving problems in the teaching–learning domain differ for the two categories of respondents—professors and students—we applied the T-test for independent samples. According to the results obtained (Table A2 Independent Sample Test), significant differences depend on the status category (professor or student) regarding the self-reported adaptability level ($t(425) = 8.343$. $p < 0.001$) (Figure A1 Distribution of Adaptability Self-Reports Across Status) and creativity ($t(425) = 5.553$. $p < 0.001$), the need for help in online teaching–learning ($t(425) = -12.103$. $p < 0.001$), and collaboration with colleagues for solving problems in the online teaching–learning medium ($t(425) = 2.431$. $p < 0.001$).

3.1.2. Differences between Professors and Students Regarding Their Relation to the Online Learning Medium

We applied the χ^2 for the association to check if professors and students relate differently to online teaching–learning. The results of the Pearson χ^2 test and the indicators are synthetically presented in Table A3 (Chi-Square Tests.) Regarding the difficulties that the respondents encountered, professors' answers did not differ significantly from those of students ($\chi^2(11) = 16.993$, $p = 0.108$). In Figure A2 (the relationship between status and difficulties in online environment), we can note the graphic representation of the scores district button.

Neither do the professors' opinions on online teaching and learning differ from those of students ($\chi^2(8) = 6.767$, $p = 0.562$) (Figure A3 the relationship between status and opinions about online teaching). In contrast, professors and students relate differently to the recognition of the efforts of improving the teaching activity of professors ($\chi^2 (2) = 12.564$, $p < 0.01$).

As we can note in Figure A4, which depicts the relationship between status and teacher's teaching improvement, a higher than expected number of students consider that professors do not change aspects that do not work in online teaching. The indicator of the measure of the coefficient, phi = 0.172, shows a modest relationship between the two variables, according to Cohen (1988).

3.1.3. Differences Depending on the Age of Respondents, Regarding Their Relationship with the Online Learning Environment

It was interesting to investigate if the respondents have different difficulties depending on the age category. The results for the Pearson χ^2 test and impact indicators are presented synthetically in Table A3 (Chi-Square Tests). Regarding the difficulties that respondents encountered, the answers of professors differed significantly from those of students ($\chi^2 (55) = 70.210$, $p < 0.05$). In Figure A5, which shows the relationship between age category and difficulties in the online environment, we can note the graphic representation of score distribution.

3.2. Qualitative Research

The qualitative research objective was to explore students' and professors' opinions about online teaching and learning.

The answers to the question "What works in online teaching–learning as it is now?" were codified into 14 categories (Table A4 Descriptive statistics item "What works in online teaching–learning?"). Before analyzing the answers obtained, we discovered that 88 respondents (20.6%) consider that they do not know the functional aspects of online teaching. Of these, 47 (21.2%) are students, and 20% are professors, which indicates a limited experience of this type of education.

In the category "lectures, students' participation and homework", 52 answers were included (12.2% of the total number of respondents), with an equal number of professors and students. Video/audio conferencing with explanations is considered an advantage of online education only by 24 students (10.8%) and 15 professors (7.3%). Characteristics such as convenience, accessibility, and freedom of student learning are considered advantages of online education by 48 (11.2%) in total, comprising 24 professors and 24 students.

Communication-broadcast-reception/interactivity/collaboration is a category that refers more to the characteristics of the platforms used. The category represents a significant positive element for 19 (8.6%) students and 17 (8.3%) professors. Loading of course support and materials represents the category of support materials for learning. Their availability is considered an advantage for 16 (7.2%) students and 14 (6.8%) professors. The similarity with face-to-face courses is recorded by five students (2.3%) as an advantage. Characteristics such as ease, speed, timeliness, information security, freedom to learn at your own pace, and assessment tests are advantages of this type of education for 24 (10.8%) students and 21 (10.2%) professors. E-learning platforms' technical qualities, including Zoom, Big Blue, MOOCs, and flipped classroom, are appreciated by 23 respondents (5.4%), and communication through e-mail, sites, chat, forums, and WhatsApp is appreciated by 19 respondents (4.4%).

Traits of teachers, such as interest, responsibility, involvement, creativity, and optimism, were expressed by eight persons (1.9%), four professors and four students, highlighting professors' availability to continue the work started face-to-face. Only a single professor is satisfied with the opportunity of learning the programming language. The group of enthusiasts regarding online education, who are satisfied with everything this alternative represents, comprises 14 students (6.3%) and 17 professors (8.3%).

The second part was to discover how respondents define the limits of online teaching–learning as it is now. The answers were codified into nine categories (Table A5 Descriptive statistics item "What does not work in online teaching–learning?").

The category with the most answers (115, representing 26.9% of the respondents) includes aspects related to platform problems: interruptions, slow connection, malfunctioning microphones, and other technical problems. The second category, chosen by 101 respondents (41 professors and 60 students), representing 23.7% of the total number of subjects, refers to teachers' digital skills. More specifically, teachers' digital assessment skills are seen as a limit in online education only by 25 participants (5.9%). How communication, interactivity, and empathy are carried out in this environment are disadvantages for 51 (11.9%). Not all didactic activities can find a correspondent in online activities. Many respondents, 18 (4.2%), consider that certain laboratory classes are a disadvantage in the online environment. Another important category of disadvantages, namely experiences in online teaching–learning, is drawn from 29 (6.8%) participants' answers. Problems related to internet connection were raised by 83 education actors (19.4%). These do not reference the characteristics of the connection to the Internet of universities but users' personal networks.

The lowest number of responses received for disadvantages is the access to the library's digital resources, outlined in three (0.7%) answers, and the level of students' involvement, signaled by two (0.5%) students.

What should be improved in online teaching–learning practice?

Following the analysis of the answers, these were classified into seven categories (Table A6 Descriptive statistics item "To be improved"), chosen as follows: Internet connection, platform (35.1%); teaching methods, interactivity (20.1%); communication mode (14.3%); teachers' digital skills (11.2%); technological support (7.7%); digital collections (7%); and students' digital skills (4.4%).

The interviews were necessary because the combination of answers and their convergence raised both the professor's and students' profiles. Thus, we discovered the following profiles of professors:

1. The anxious professor, who overwhelms students with homework, tasks, who exaggerates the online and offline work amount both for themselves and for the students, without empathy to their situation, not adapted to their conditions;

2. The negligent professor, who uploads an impressive number of didactic and study materials to the platforms, waiting for students to learn by themselves, without being guided or accompanied; and

3. The efficient professor, who combines harmoniously new knowledge, the number of assignments, and modifies their online didactic behavior depending on students' feedback or following collaboration with colleagues. They use methods that stimulate collaboration among students, metacognition, and motivate students to develop self-regulated learning.

The profiles of students that were highlighted were as follows:

1. The student who procrastinates, fails in adapting to a new schedule, to new requirements and who speculates or refuses to observe the conditions and rules imposed by online education; and

2. The conscientious student, with a high adaptability level, with a high self-regulation level of learning or awareness of the needs of development in this respect, has good or improved time management.

4. Discussion

The overarching aim of this research was to underline how education agents relate to online teaching in crisis conditions. Secondarily, we wanted to discover different opinions among professors and students regarding the advantages, disadvantages, vulnerable areas, and aspects that can be improved.

In the first stage of data collection, when this passage to online education was at its beginning, many aspects were considered non-functional by respondents (platforms, communication, and professor–student interaction), and the participants displayed mainly rejection attitudes. These can be due to the extreme novelty character for some of them, and the coping modalities were tightly related to the adaptability expressed. The results obtained have shown that there are no significantly different opinions among professors and students regarding the advantages, disadvantages, vulnerable areas, and aspects that can be improved. It was amazing to discover that both categories of participants identified the same characteristics of the online medium.

Hattie evaluated over 800 meta-analyses in search of some characteristics essential for efficient teaching [52]. Some of the essential characteristics are clarity of explanations, positive interactions among students and professors, and constant feedback. At the beginning of the exploration of online education, many of the students in our study complained about one particular weakness of online educational interaction, namely this poor clarity of explanations. They justified this choice with technical difficulties encountered because of e-learning platforms used and difficult study materials, without explanations from the professor or without examples. After an adjustment period of three weeks, to online education, the clarity of explanations did not represent a weakness anymore. On the contrary, students stated in interviews that professors showed their availability to help them understand by offering further explanations.

Positive interactions between students and professors were reported as a weakness of online education, both by professors and students. One of the professors stated: "I miss my students. It is so strange to be alone in front of a computer, with a series of names that can be engaged in the course or not receive their feed-back. They appear online, but this does not guarantee that they listen or understand what I say in a videoconference. It is disarming. I do not know if I can get used to that". Another professor recalled a relatively funny experience. "I was working in great haste to explain some content, and suddenly, a strong lathe noise was heard that we could not continue our course. Probably, the respective student was at work, and seemingly, he was listening to the course. What should I believe? What did he understand?"

A student stated that participation in online courses or videoconference is "as if I listened to a film on the radio. We are many students who enter online at the same time; therefore, to block the platform, we use the listening mode. It is so difficult to focus in this way and to understand something too.

Hardly had I resumed that course than the schedule said to be present at another course. I personally do not like it at all and I do not want it this way anymore."

The lack of constant, real-time feedback given to students is also a weakness of online education during crisis times. Some students stated that they lacked the courage to ask questions if they were ridiculed in front of their peers or because they did not want to become a laughing stock. For this reason, they lack courage even to take the initiative in online communication; they dare answer only if directly asked by the professor. The tactics are often "My microphone is not working" and "Connection interrupted".

Reeves & Reeves stated that university professors are rightly specialists in their field, but this does not necessarily mean that they have the necessary competencies for transforming the learning environment into an efficient and sustainable one, even more so to design an efficient online education approach [9]. Therefore, they need to be open and search for institutional help among colleagues with more experience or developed competencies. Our study results show that only those with a high level of adaptability and openness are capable of such initiative. One of the professors explained his reluctance to look for help by the need to protect his image. "How shall I ask? To let people comment on my lack of understanding the guide that the university made available for me? For what? I am not even obliged to do this. It is enough that I posted materials on the platform. Let them read and clear this all up."

This finding is consistent with the results of recent studies with similar research designs [53,54] which show that negative attitudes towards online education influence the amount of effort that students are willing to offer. The results also confirm the conclusions of other studies [55,56], stating that collaboration and providing feedback make students feel more responsible for their work. The data obtained are relevant both for the teaching staff members and the decision-makers in the field of educational policies. Our results are consistent with some studies [57,58], insisting upon the importance of a transformative formation. Recent research on teaching in the context of the COVID-19 situation emphasizes that students must become more autonomous in reading and in understanding guidance in online learning. The teacher's central role is to support them in becoming the titleholder of his/her acquisition development and to sustain the transformative learning process [59]. Interestingly, recent research shows that even early career teachers', who belong to the digital generation, do not demonstrate a high level of digital skills [60]. Therefore, teacher training needs to be reviewed.

Online learning has been used in education for a long time, with the primary purpose of increasing the training process's efficiency and effectiveness, aiming at speed, low costs, and quality. Therefore, it increases the probability that the student learns better, at his own pace of learning. This form of education combines formal with informal learning, stimulating collaboration with colleagues and specialists, creating virtual communities. Moreover, saving time allows the investment of the most important resources in the development of autonomous thinking abilities and decision-making. Indeed, this pandemic context has forced the change of many assumptions and beliefs about the meaning of our experience, learning, and digital tools of both teachers and students, consciously implementing strategies to establish new paths of defining their worlds.

Our study results show that only those with a high level of adaptability and openness can search for help in developing digital competencies. The data obtained are relevant both for the teaching staff members and the decision-makers in educational policies. Teacher training needs to be reviewed, incorporating a much more elaborate exercise in digital skills and online teaching.

5. Limitations

Although the study reveals the points of view of a large population of professors and students from Central and Eastern Europe and North and Central Asia, the results are limited in terms of their level of generalizability because of cultural contexts and participants' particularities from each country. Another limitation is related to the item construction that measured the level of adaptability and that of creativity. Self-reporting and self-evaluation can be a risk factor because of social desirability.

Future research could focus on using specific tests for measuring the level of adaptability and the level of creativity, avoiding self-reporting. Moreover, the research design could be improved by investigating the development of digital competencies and their relation to a certain level of performance or efficiency.

6. Conclusions

Although the forced passage to the online alternative of education represents a necessary measure, it is not enough. According to the results of our study, one can learn from this experience: in many countries, the aspects that need to become a priority in online education are those regarding mainly the didactic quality of the learning experience. It is not enough to be the right specialist in order to be a bright professor. This is an old conclusion preserved, irrespective of the real or virtual medium in which education takes place.

Initially, it was considered that making study materials available for students is enough. The results of this study show that precisely this aspect (knowledge reporting) counts the least. Aspects such as professor–student interactions, the motivating of the latter, the stimulation for obtaining feedback in real time, and changing/improving the pedagogic design, following this feedback, allow the particularization of the educational approach to the characteristics of a reference group. This didactic behavior allows education to be centered on the student, giving them the quality of an emotional partner in the educational process.

Even if the crisis moment specific to our times (COVID-19) will disappear, "Pandora's box" has been opened, which leaves room for multiple institutional evaluations and a review of the professional development of members of the teaching staff, by reconsidering the role both of digital competencies and didactic ones. One of the professors stated, "There is a positive aspect in this whole story. Let us say that [COVID-19] ends, and it does not happen again, but you remain with so many online materials that, of course, you can process, improve. But you will not start from scratch again."

Appendix A

Figure A1. Distribution of adaptability self-reports across status.
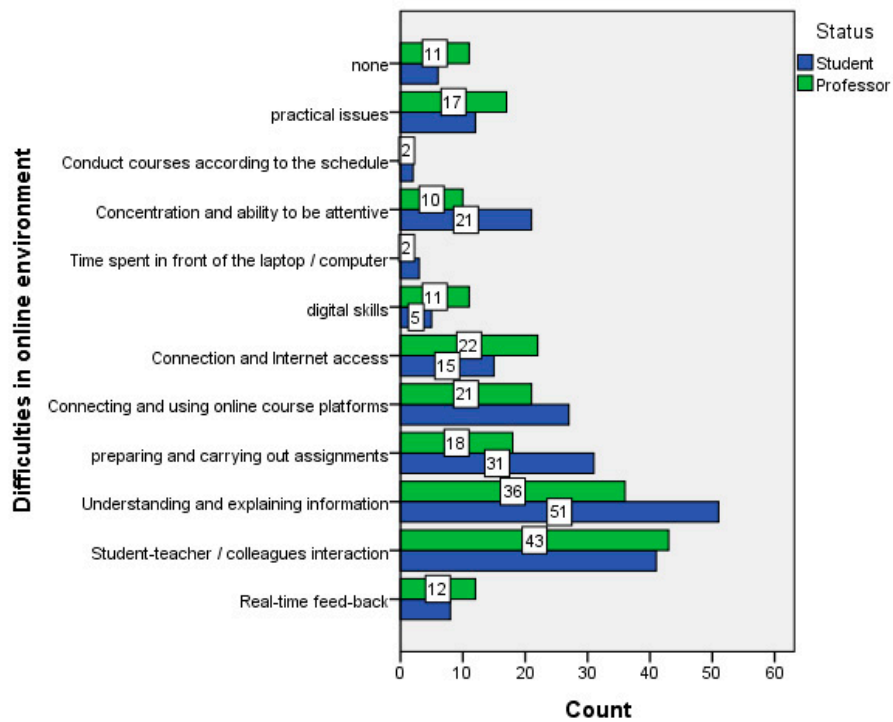
Figure A2. The relations between variables of status and difficulties in online environment.
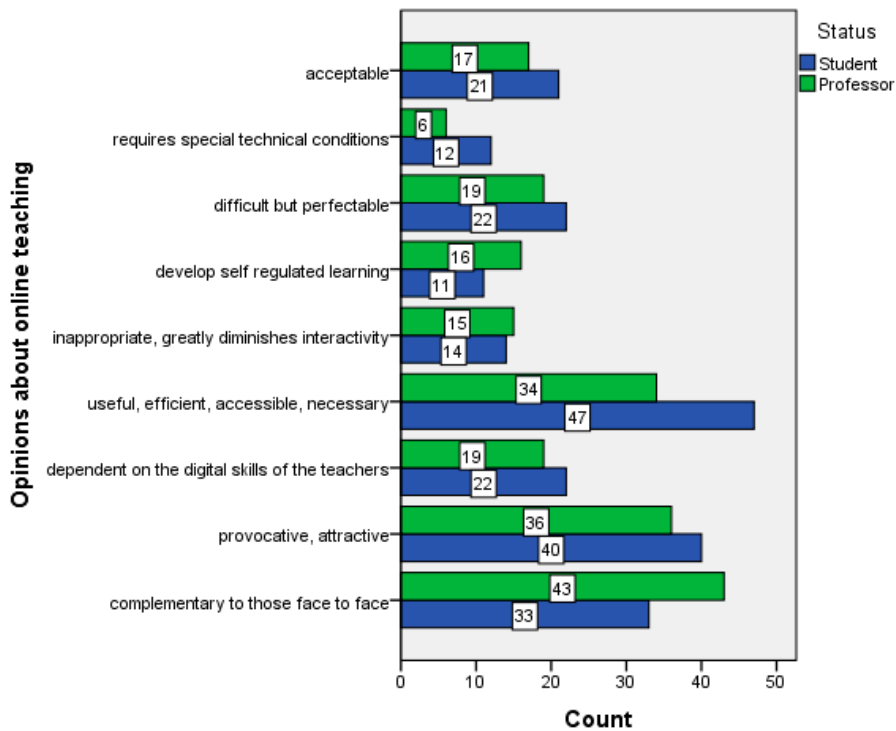

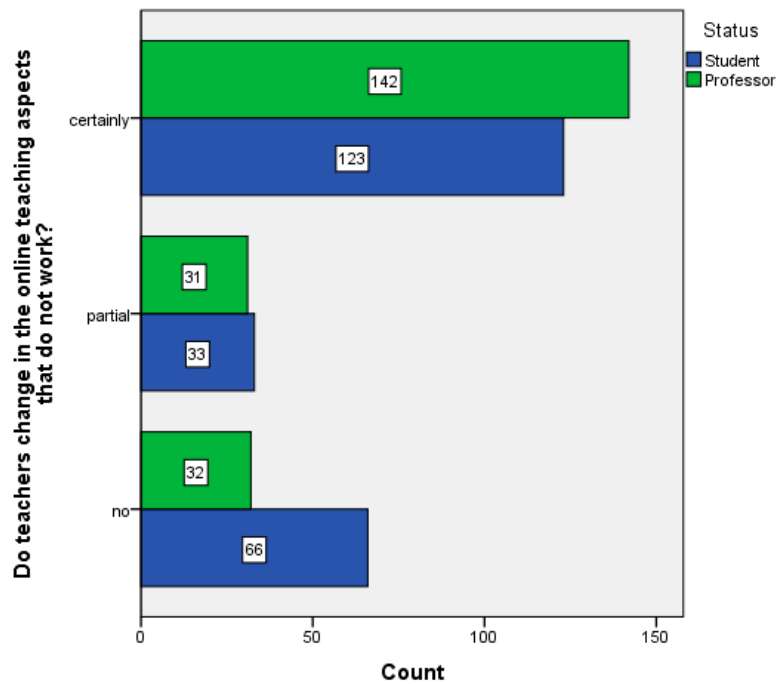**Figure A3.** The relations between variables of status and opinions about online teaching.

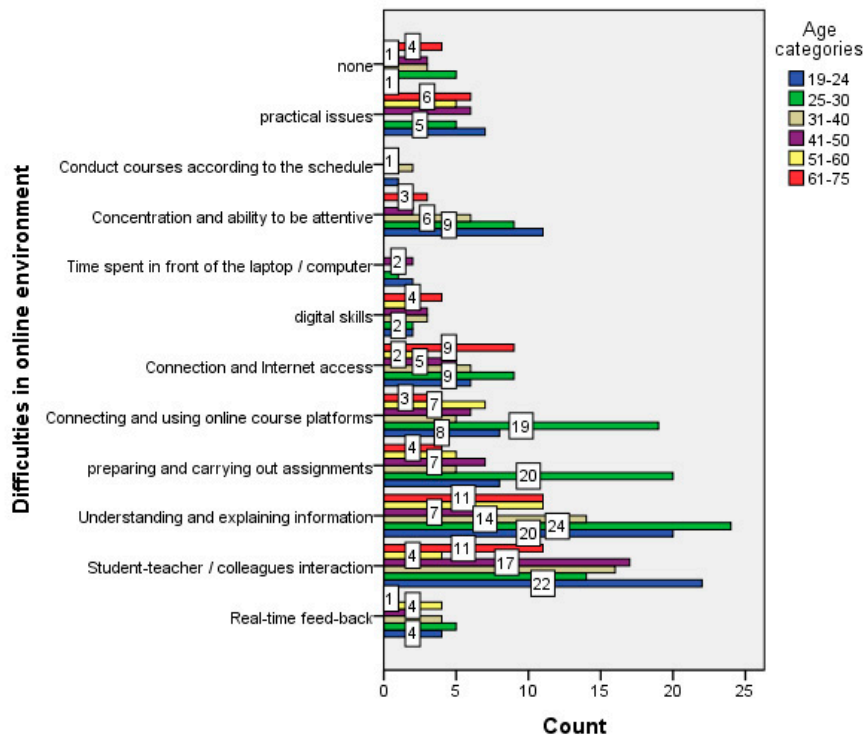**Figure A4.** The relations between variables of status and teacher's teaching improvement.

Figure A5. The relations between variables of age category and difficulties in online environment.

Table A1. Sociodemographic characteristics of respondents.

Countries	Number	Percent
Armenia	13	3.0
Bosnia and Herzegovina	13	3.0
Croatia	21	4.9
Estonia	12	2.8
Georgia	13	3.0
Germania	12	2.8
Hungary	26	6.1
Kazakhstan	21	4.9
Moldova	28	6.6
Montenegro	19	4.4
Romania	158	37.0
Russia	28	6.6
Tajikistan	15	3.5
Turkey	19	4.4
Uzbekistan	29	6.8
Age	**Number**	**Percent**
19–24	92	21.5
25–30	113	26.5
31–40	64	15.0
41–50	61	14.3
51–60	41	9.6
61–75	56	13.1
Area	**Number**	**Percent**
Rural	99	23.2
Urban	328	76.8
Gender	**Number**	**Percent**
Female	316	74.0
Male	111	26.0
Status	**Number**	**Percent**
Professor	206	48.0
Student	222	52.0
Study Domain	**Number**	**Percent**
Engineering	146	34.2
Social Science	171	40.0
Art	44	10.3
Medicine	33	7.7
Economics	28	6.6
Mathematics–Informatics	5	1.2
Total	**427**	**100.0**

Table A2. Independent samples test group of teachers and students.

				t-Test for Equality of Means					CI [4]	
	N	Mean	S. D.	t	df	P [3]	Mean Difference	Std. Error Difference	Lower	Upper
Adaptability	205	3.14	1.15	8.34	425	0.00	0.89	0.11	0.68	1.10
Creativity	222	3.93	1.00	5.55	425	0.00	0.56	0.10	0.36	0.76
Help needed [1]	222	2.15	0.96	−12.10	425	0.00	−1.28	0.11	−1.49	−1.07
Collaboration [2]	205	2.82	1.03	2.43	425	0.01	0.26	0.11	0.05	0.47

[1] Help needed in online teaching learning; [2] Collaboration with colleagues in online problems; [3] P. significance (2-tailed); CI [4] 95% confidence interval of the difference.

Table A3. Chi-square tests professors versus students.

Status	Pearson Chi-Square Value	df	Asymp. Sig. (2-Sided)	Phi Value	Approx. Sig.
Difficulties in online environment	16.99	11	0.10	0.19	0.10
Opinions about online teaching	6.76	8	0.56	0.12	0.56
Do teachers change the online teaching aspects that do not work?	12.56	2	0.00	0.17	0.00
Difficulties in online environment	70.21	55	0.05	0.40	0.05

Table A4. Descriptive statistics item "What works in online teaching–learning?".

What Works in Online Teaching Learning * Status Crosstabulation				
Category		**Status**		**Total**
		Student	**Professor**	
Lectures, student participation and homework	Number	26	26	52
	% Status	11.7%	12.7%	12.2%
Video conferencing/audio conferencing with explanations	Number	24	15	39
	% Status	10.8%	7.3%	9.1%
Learning the programming language	Number	0	1	1
	% Status	0.0%	0.5%	0.2%
I do not know	Number	47	41	88
	% Status	21.2%	20.0%	20.6%
all	Number	14	17	31
	% Status	6.3%	8.3%	7.3%
Convenience, accessibility, freedom of student learning	Number	24	24	48
	% Status	10.8%	11.7%	11.2%
Communication-broadcast-reception/interactivity/collaboration	Number	19	17	36
	% Status	8.6%	8.3%	8.4%
Loading of course support and/or materials	Number	16	14	30
	% Status	7.2%	6.8%	7.0%
Similar to face-to-face courses	Number	5	0	5
	% Status	2.3%	0.0%	1.2%
Ease, speed, timeliness, information security, freedom to learn at your own pace	Number	24	21	45
	% Status	10.8%	10.2%	10.5%
Assessment tests	Number	1	1	2
	% Status	0.5%	0.5%	0.5%
Technical qualities of E-learning platforms: Zoom, BigBlue, MOOCs, Flipped classroom	Number	10	13	23
	% Status	4.5%	6.3%	5.4%
Email, sites, chat, forums, WhatsApp	Number	8	11	19
	% Status	3.6%	5.4%	4.4%

Table A4. *Cont.*

What Works in Online Teaching Learning * Status Crosstabulation				
Category		**Status**		**Total**
		Student	**Professor**	
Traits of teachers: interest, responsibility, involvement, creativity, optimism	Number	4	4	8
	% Status	1.8%	2.0%	1.9%
Total	Number	222	205	427
	% Status	100.0%	100.0%	100.0%

* comparing to the variable.

Table A5. Descriptive statistics item "What doesn't work in online teaching–learning?".

What Doesn't Work in Online Teaching–Learning * Status Crosstabulation				
Category		**Status**		**Total**
		Student	**Professor**	
Internet connection	Number	38	45	83
	% within status	17.1%	22.0%	19.4%
Students' involvement	Number	2	0	2
	% within status	0.9%	0.0%	0.5%
Platform problems: interruptions, heavy connection, malfunctioning microphones, other technical problems	Number	58	57	115
	% within status	26.1%	27.8%	26.9%
Practice, certain laboratories	Number	11	7	18
	% within status	5.0%	3.4%	4.2%
Digital skills of teachers	Number	60	41	101
	% within status	27.0%	20.0%	23.7%
Digital assessment skills of teachers	Number	15	10	25
	% within status	6.8%	4.9%	5.9%
Communication, interactivity, empathy	Number	28	23	51
	% within status	12.6%	11.2%	11.9%
Access to digital resources of the library	Number	0	3	3
	% within status	0.0%	1.5%	0.7%
Experience in online teaching-learning	Number	10	19	29
	% within status	4.5%	9.3%	6.8%
Total	Number	222	205	427
	% within status	100.0%	100.0%	100.0%

* comparing to the variable.

Table A6. Descriptive statistics item "To be improved".

To Be Improved * Status Crosstabulation				
Category		**Status**		**Total**
		Student	**Professor**	
Digital collections	Number	16	14	30
	% within status	7.2%	6.8%	7.0%

Table A6. *Cont.*

Category		Status		Total
		Student	Professor	
Communication mode	Number	28	33	61
	% within status	12.6%	16.1%	14.3%
Connection, platform	Number	86	64	150
	% within status	38.7%	31.2%	35.1%
Teaching methods, interactivity	Number	44	42	86
	% within status	19.8%	20.5%	20.1%
Teachers' digital skills	Number	24	24	48
	% within status	10.8%	11.7%	11.2%
Students' digital skills	Number	8	11	19
	% within status	3.6%	5.4%	4.4%
Technological support	Number	16	17	33
	% within status	7.2%	8.3%	7.7%
Total	Number	222	205	427
	% within status	100.0%	100.0%	100.0%

*To Be Improved * Status Crosstabulation* header spans the top of the table.

* comparing to the variable.

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