

Article

Transition from Online to Face-to-Face Education after COVID-19: The Benefits of Online Education from Students' Perspective

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Abstract: The COVID-19 pandemic has left a mark on education as it had been known before. Beyond this, attention needs to be paid to the transition back to face-to-face learning and its implications. Within this context of change, the present research focuses on identifying the students' preferred aspects of online education during the pandemic, namely learning, teaching, assessment, and interaction with peers and teachers, in order to improve face-to-face education by contextually adapting it to their needs. A survey was used on a representative sample of students from Politehnica University of Timisoara, Romania, who were required to indicate their preferred form of education and the most beneficial one for their professional development. The results indicate the targeted students' several preferences, such as teachers' support with electronic educational resources, the use of online educational platforms to access resources and take tests, the easier and individualized communication with teachers, as well as peer connectivity in common projects. These findings identify practical suggestions that lead to a balance between face-to-face and digital education, probably under the form of blended learning, which could be considered by the main stakeholders in order to have a future sustainable education.

Keywords: face-to-face education; online education; online legacy; blended learning; learning teaching; assessment; interaction; COVID-19



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1. Introduction

Throughout the world, education has changed in recent years due to the COVID-19 pandemic. At present, the pandemic seems to have ended, at least for the moment, and as life returns to normal little by little, attention needs to be paid to the transition back to face-to-face education and its implications. In other words, it might be necessary to “reimagine education”, as recommended by the United Nations [1]. Research should be carried out in order to see what aspects from online education during the pandemic may be useful to consider in the current form of education. Important aspects to bear in mind are technology adoption into the classroom, innovative and smart technologies [2–6], new teaching approaches, and students' experiences and perceptions.

E-learning, online education or emergency remote teaching during the pandemic has been researched thoroughly [7–14], focusing on various topics, such as students' perception on online and face-to-face education in terms of learning, teaching, assessment, and interaction with teachers and peers. Nevertheless, little attention has been paid to what happens after the pandemic and to what students feel and think about returning to face-to-face education. The present paper points out some of the studies conducted on the topics mentioned above and then, within this context, aims to analyze students' feelings and opinions about them. In addition, it intends to identify students' beliefs about returning to face-to-face learning in the post-pandemic world and what aspects could be borrowed from

the pandemic education to the present education in order to ensure its future sustainability in relation to the topics under discussion.

This study focuses on a sample of Romanian students from Politehnica University of Timisoara. Romania, as all the countries in the world, has been affected by the COVID-19 pandemic and, as a result, Romanian universities moved their teaching–learning activities to the online environment. Each university adopted different strategies for this, as Romanian universities have autonomy in terms of their mission, institutional strategy, structure, activities, organization, and functioning, even though the education system is centralized [15]. In the case of Politehnica University of Timisoara, a well-known university with a tradition of more than one hundred years, e-learning was not a novelty. Its students and teachers have been used to a “Virtual Campus” based on Moodle as an e-learning platform within the department dedicated to distance learning since 1998. This platform helped the transition to online teaching during the pandemic for all the study programs at all the three study cycles.

Romanian research has also followed the trend and issues, such as students’ feelings about online learning, and the advantages and disadvantages of online learning over face-to-face learning [7,16–21], the types of platforms used in the online education process [22], and students’ behaviors during online classes [23] have been investigated. However, no study has been carried out yet on the future of education and on how technology and other aspects of online learning considered useful will influence and, even more, be present, in the face-to-face education post-pandemically. Students’ experiences and beliefs on these issues may be of help to reconsider education after the COVID-19 pandemic and sketch a new sustainable model. That is why the present study focuses on this topic, intending to bring novelty to the field of education in all its aspects, namely learning, teaching, assessment, and interaction, and points out practical suggestions to improve them.

2. Literature Review

This section presents other related studies carried out worldwide, paying attention to two main aspects, i.e., students’ perceptions on online education during the pandemic and the return to face-to-face education after the pandemic.

2.1. Students’ Perceptions on Online Education during the Pandemic

Distance learning, also referred to as online learning or e-learning and often used interchangeably [8], is opposed to the traditional mode of learning (face to face) by making use of ICT (information and communications technology) as a means of connecting and enabling communication between students and teachers for educational purposes, targeting mainly “nontraditional students” (i.e., people working full time or people unable to physically attend classes) [9]. Some researchers [10] consider online learning as a newer or as an improved version of distance learning.

Online education (the term that will be used in this article, as it encompasses all the aspects discussed below, i.e., learning, teaching, assessment, and interaction) was thus a beneficial way through which universities managed to attract students, who were either in faraway locations or who had a full-time job, helping them to work and learn at the same time and saving on campus costs [11]. Therefore, even though this type of education was not a new phenomenon, having been implemented in the last two decades with continuous improvements for students and teachers alike [12–14,24,25], the outbreak of the pandemic and the forced transition to full online learning and teaching activities still shocked and felt challenging and difficult for all the educational parties involved. Nevertheless, it seems that the previous experience as a distance learning student, already having taken online classes, made a positive difference in the way the students perceived the emergency transition to online classes [26]. Positive as well as negative feedback has been received from them regarding the transition to online classes during the pandemic as far as online learning, teaching, assessment, and interaction are concerned.

2.1.1. Online Learning during the Pandemic

The body of literature advocates that, while there are shortcomings such as technological problems (unavailability of electricity and connectivity issues) [27], the lack of a sense of belonging and of social encounters and relationships with peers [28–31], and the home study environment (lack of space and distractions) [27,31], the main advantages of online learning are several. These comprise flexibility [32–34], information accessibility [35,36], learning at one's own pace [36], and cost-effectiveness [33].

Students have also reported disadvantages regarding online learning—perhaps the most important ones are those related to their physical and mental health. Eye strain and cervical stiffness were among the most common physical problems encountered [37,38], while anxiety, frustration, anger, hopelessness, and shame were the most prominent mental issues [37,39] students had to deal with. Post-traumatic stress and mental pressure [40,41] were also noted as a result of the pandemic and its influence on online learning.

Academic performance was also affected by online learning. Li and Che [37] observed that academic performance decreased in lower-grade students (freshmen and sophomores). Additionally, there are studies that linked the online academic performance to gender, with male students perceiving it as a negative experience as opposed to female students who had more positive feelings about it [42].

2.1.2. Online Teaching during the Pandemic

The problems related to online teaching that students red-flagged were the information overload [30], the quality of online instruction [27], and the inability to adapt the course structure to the online teaching format. A study carried out at the University of Leon, Spain, showed that students were dissatisfied with the way in which teachers adapted the structure of the course content when studying online as compared to when studying face-to-face due to the excessive amount of work they were required to complete [43].

There are also cases when online teaching made students feel comfortable. For example, they were provided with the possibility of asking questions using the chat function in Zoom to not disrupt the class [44].

2.1.3. Online Assessments during the Pandemic

With the beginning of the pandemic and of the online education, universities were forced to develop new and different ways of assessing their students [45]. Some university teachers were more than willing to change their feedback practices and help their students despite the challenges imposed during that period [46].

As regards students' opinion, some stated that they felt overwhelmed with online tasks, which increased [39], and that they received less feedback and fewer valuable comments [42], while others stressed that online assessment concentrated more on a thorough understanding and not so much on facts [42]. Additionally, students showed a preference for the video channel over the audio or written channels as the most effective medium to receive feedback from teachers [47]. At the same time, students expressed the need to receive more feedback from teachers, but in a timely and detailed manner [31,48]. Cheating seems to be another problem encountered in the online assessments [49,50], reducing thus the significance of such examinations.

2.1.4. Online Interaction during the Pandemic

The classroom is made up of a combination of interpersonal relationships creating a "unique community" [51]. Peer–peer interaction is an important 'ingredient' of this community, fostering connection, dialogue, and communication and supporting productive learning [52], especially more so at present, due to the challenges imposed by an online setting. Still, the pandemic has forced students and teachers alike into adapting to this new setting. In some cases, in order to strengthen the interaction, projects, groupwork, and assignments were moved to WhatsApp groups where students could collaborate on the given tasks [53]. All in all, numerous studies posit that students viewed the online

interaction experience as a positive one [53–56]. Other studies, on the other hand, report that students did not feel connected to their peers when studying online [44].

As for the teachers, the lack of physical interaction with students left them rather disappointed since student–teacher rapport is paramount for teaching activities [57], although research shows that it was not important for student satisfaction during online learning [58]. One of the reasons for this disconnection might also be the fact that students keep their cameras off during lectures and practical activities [59], leading to an “absence of emotional closeness”, which is completely demotivating [60].

2.2. Students’ Feelings and Opinions on Returning to Face-to-Face Education after the Pandemic

As 2022 saw the return to face-to-face education, research has been conducted to gauge students’ feelings and opinions regarding this issue for a better implementation of safety measures and for an outlook on how the university life might look like in the future both from a learning and a teaching perspective.

Researchers point out the fact that the “new normal” [61,62], i.e., pandemic time, and the “next normal” [16], i.e., post-pandemic time, belong to online learning [63] or to a more suitable alternative, blended learning [64–66], which might counteract some of the online learning’s disadvantages.

As far as the online classes after the pandemic are concerned, the students seem to have conflicting views about them. Paudel [67] reports that the interviewed students showed their willingness to take online courses in the future. The same insight is offered by Horváth et al. [68], who present the case of their students, who consider online platforms efficient and cannot imagine their learning experience otherwise.

On the other hand, there are students who did not like the online experience and would not like to continue it after the pandemic. A lack of technical support, unclear institutional policies and guidelines, teachers’ inability to effectively facilitate online learning, lack of interaction, Internet connectivity problems, the unsuitability of home-learning environments, limitations regarding practical aspects of learning in the laboratory, and eyesight issues are among the reasons for this rejection of online education [27,68–70].

Another aspect that has risen concerns when the pandemic ends is students’ mental state (anxiety, depression, panic, anger, and rebellion) as a result of the stay-at-home orders and the turmoil created by the pandemic [71]. Thus, returning to face-to-face education could definitely be one of the solutions for students to regain their social skills.

2.3. Romanian Students’ Feelings and Opinions on Returning to Face-to-Face Education after the Pandemic

Romanian students’ perceptions on online learning have also been investigated by researchers. Romanian universities ceased face-to-face teaching activities on 11 March 2020, which impacted education and reconfigured the entire academic life. In order to test students’ progress, studies have been carried out on students with different types of specializations, i.e., engineering [7,16], medicine [17], and economics [18].

As well as their international counterparts, Romanian students also experienced contradictory feelings regarding education during the pandemic. Comfort, flexibility, cost-saving, and time management are also among the positive aspects of online learning mentioned by the students [17,19,20]. The negative aspects of online learning perceived by Romanian students are not very different than the ones reported by other studies, i.e., stress, isolation, loneliness, lack of concentration, and low motivation [19,21].

Studies investigating Romanian students’ feelings about what the future holds in terms of education have not been conducted to date to the best of the research team’s knowledge. Even though universities have understood the benefits for such a type of learning and teaching from their perspective (i.e., online or blended), students, the recipients of the educational process, should also be taken into account as their opinions, feelings, needs, and educational progress are paramount in this respect. At the same time, understanding

the factors underlying their responses will prove valuable in sketching the new normal in university teaching.

Considering this, the present study seeks to find out the Romanian students' feelings and opinions regarding their educational experience during the pandemic (learning, teaching, assessment, and interactions) as well as their expectations for the post-pandemic education. It needs to be borne in mind that, starting from the second semester of 2022, Politehnica University of Timisoara adopted a blended learning approach (face-to-face practical activities and online courses), moving gradually to a complete face-to-face approach by the end of the semester.

The researchers had in mind five research questions, namely:

1. What are the aspects of online learning that students do not encounter in face-to-face learning, but would like to?
2. What are the aspects of online teaching that students do not encounter in face-to-face teaching, but would like to?
3. What are the aspects of online assessment that students do not encounter in face-to-face assessment, but would like to?
4. What are the aspects of online interaction with teachers and peers that students do not encounter in face-to-face interaction, but would like to?
5. What is the students' perception regarding the effort and the level of difficulty of switching from online to face-to-face education and the form of education considered to be more beneficial for their professional development?

3. Materials and Methods

To collect the data, the research team used a survey based on a questionnaire, which is a quantitative method of investigating social problems [72,73]. The sequence of the research stages was the following: formulating the questions of the questionnaire, establishing the population to be investigated, of the method of data collection, and the design of the working tool, followed by collecting the information, analyzing the answers, and writing the research report. To check the reliability of the questionnaire items, the Cronbach alpha coefficient was calculated. As this has a value greater than 0.9, the questionnaire items have a very good reliability [74], and the questionnaire used is internally coherent.

3.1. Sample

The data were collected between May and June 2022, and the subjects were selected from all years of study and from all specializations within Politehnica University of Timisoara. The responses of 387 subjects were recorded, with the margin of error calculated by reference to the student population of this institution (13 thousand students) being of $\pm 5\%$. The average age of the respondents was 22.5 and the gender distribution shows a population distribution similar to that of the entire university student population (60% male and 40% female).

3.2. Research Instruments and Data Collection

A non-standardized questionnaire was used for data collection, its content being validated by the evaluation conducted by experts, namely sociologists, followed by its qualitative and quantitative pretesting. The pilot version of the questionnaire was pretested approximately 2 months before the main study on a group of fifty students, and following this activity, the texts of the open questions were reformulated by completing them with additional information to make them more understandable among the investigated subjects.

It was built according to the studied dimensions, namely the way learning occurs, the way lectures and practical activities are taught, the manner in which knowledge is assessed and the way in which interaction with peers and teachers is carried out, the perception regarding *the effort and the level of difficulty of switching* from online to face-to-face education, and the form of education considered to be *more beneficial* for their professional development.

The questionnaire comprised nine questions (four closed-ended and five open-ended questions). The closed-ended ones are scale-type with measurement intervals of five steps and focus on comparing face-to-face to online education and the adjustment of students to going back to face-to-face education. As for the open-ended questions, since not many studies have been conducted on the benefits of online education after the pandemic nor on this category of population, the research team opted for this type of question that could provide the researchers with tools and results to achieve the proposed objectives. They allowed the respondents to freely express their own opinion regarding the aspects of online education that they would like to encounter in the face-to-face education. The analysis of these questions meant grouping and coding the answers into broad categories that would allow the processing and interpretation of the data. In addition to the closed- and open-ended questions, factual data regarding age, gender, background, faculty, specialization, year, and study cycle have also been included in the questionnaire.

The completion of the questionnaire was conducted online, freely and anonymously, with the students having the possibility to end it at any time. No rewards were offered for obtaining answers and no personal data were collected to allow the identification of the respondents. The average time required to complete the questionnaire was 15 min and the recorded response rate was of approximately 35%.

The data were analyzed using SPSS Statistics, a software package frequently used for statistical analysis.

4. Results

The results are presented according to each of the five research questions stated above for the sake of clarity.

4.1. Aspects of Online Learning That Students Would Like to Encounter in Face-to-Face Learning

One of the issues that the present study targeted was understanding the aspects of online learning (the way in which students learned online) that the students did not encounter in face-to-face learning and that they would like to experience again. As it can be seen in Figure 1, the first issue to be taken into account is related to the existence of educational resources in electronic format, with 18.5% of the respondents stating that they would also like to receive them in face-to-face learning. In the order of the percentages obtained, this answer is followed by *more time for learning* with 8% and by *better assessment and accessibility*, each with 4.4%. The *more practical/technical aspects* (4.1%) and *better interaction* (3.1%) variants can be added to these. The answer variants that obtained lower percentages are included in the *Others* category (6.8%), e.g., the fact that *lessons are better seen and heard when teaching online* (2.1%) (since, in face-to-face education in larger amphitheatres, this is a problem for students sitting at the back of the room), *flexibility* (1.8%), *comfort* (1%), *the fact that teachers are more attentive to students' problems*, and that the *learning process is stress-free* (each with 0.8%). As the results show, the category of non-answers accumulated 12% and most of the respondents considered that there are no differences between the two ways of teaching, with 38.6% indicating that there is nothing to borrow from the online way of learning.

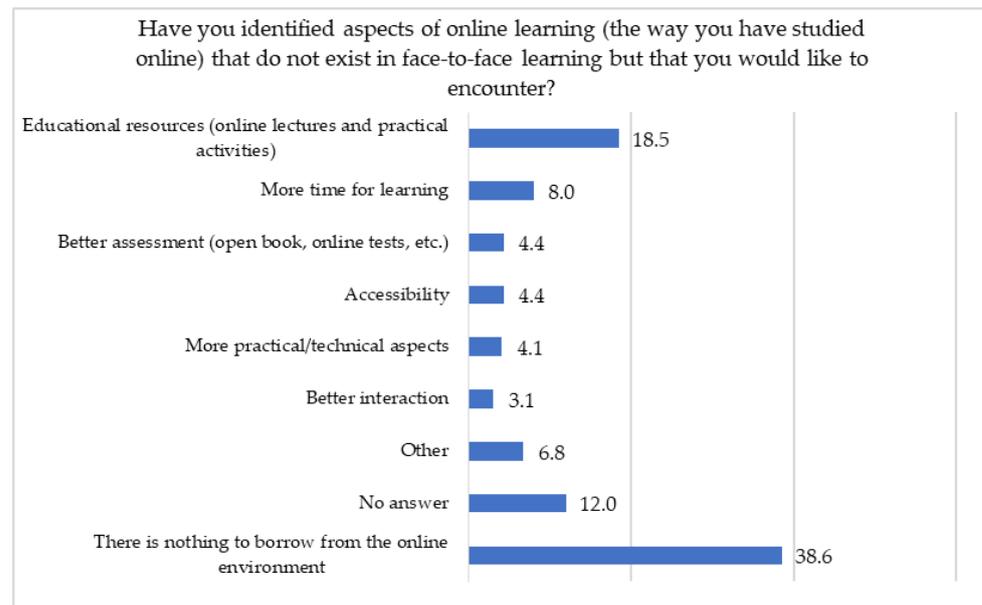


Figure 1. Aspects of online learning that students would also like to encounter in face-to-face learning activities.

4.2. Aspects of Online Teaching That Students Would Like to Encounter in Face-to-Face Teaching

Among the aspects of online teaching that students would like to encounter in face-to-face teaching activities, *the digital course materials posted on the university campus* (15.1%) were firstly mentioned, being followed at a significant difference by *interesting/interactive presentations* and *program flexibility*, each with 3.1% (Figure 2). *Electronic open book/quizzes* and *better interaction* were also mentioned, each scoring 2.6%. In the *Other* category (6.8%), the answer variants that obtained lower percentages were introduced, such as *better seen lessons* (1.3%), *more relaxing lessons* (1%), *faster feedback*, *time saving*, *shorter class duration*, *more practical aspects*, *less to learn*, *teamwork*, and *greater class attendance* (all with subunit values). In this case, the category of non-answers can also be identified, recording 16.7%, with almost half of the respondents considering that there are no aspects of online teaching that they do not encounter in face-to-face teaching (47.3%).

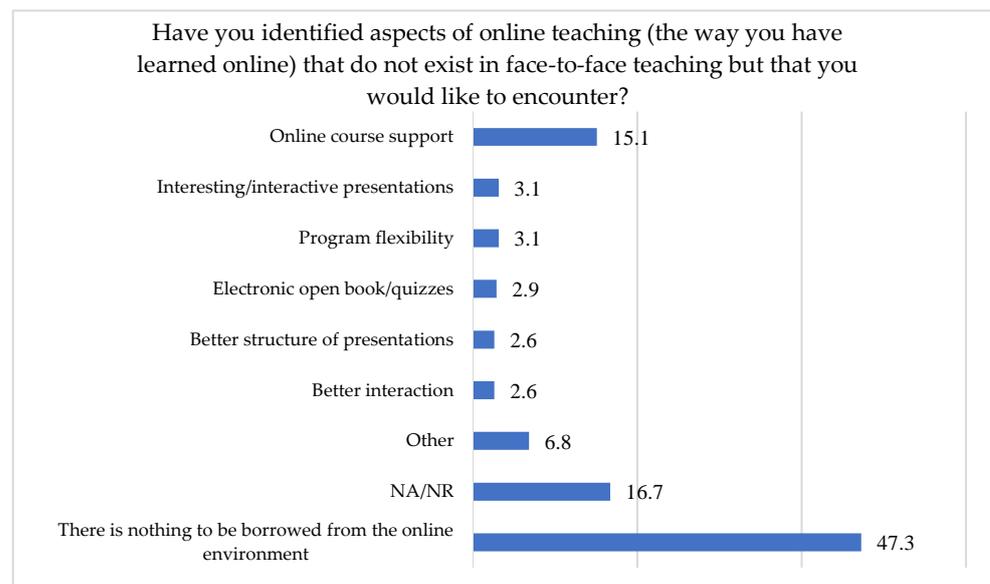


Figure 2. Aspects of online teaching that students would also like to encounter in face-to-face teaching activities.

4.3. Aspects of Online Assessment That Students Would Like to Encounter in Face-to-Face Assessment

Online assessment, with all its possible shortcomings, also had some positive aspects, as pointed out by the respondents in Figure 3. These aspects were pointed as desired to be also encountered while studying in a physical setting. On the first place, with 26.4%, *quizzes* were chosen. This type of assessment was greatly appreciated by students, probably for its speed and concreteness. On the second place, the online setting brought with it *flexibility, speed, fast feedback, and the possibility of sitting exams from everywhere*, chosen by 15% of the respondents. The next place was awarded to *open book/various learning resources* with 8%. The exams took place with the possibility for students to consult, if necessary, certain educational materials found on online platforms or within their reach. Additionally, the respondents appreciated the fact that more resources were made available to them for documentation. In many cases, evaluation was no longer based on knowledge tests, but *on projects and practical activities* (7.3%). The focus was more on finding solutions, creativity, and applying the theoretical knowledge.

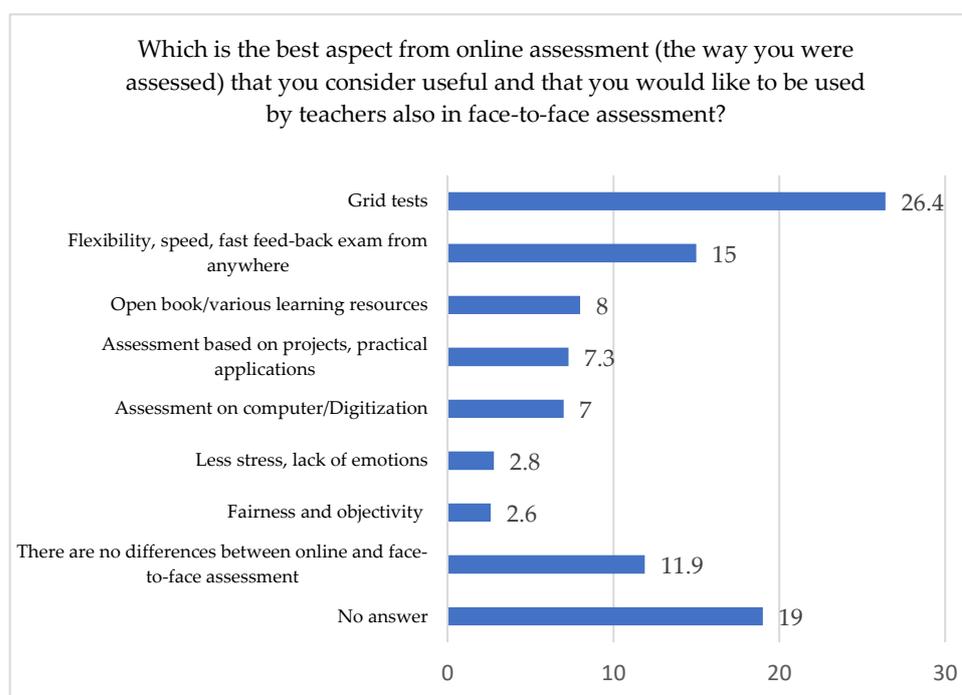


Figure 3. Aspects of online assessment that students would like to encounter in face-to-face assessment.

Another aspect mentioned by the focus group was the *assessment on computer/digitization* (7%). The online environment relieved the students from the obligation to write on paper, as they did in many face-to-face exams. The habit of everyday work and activities on the computer, phone, and tablet for learning is also expected in the assessment. If, at the beginning of the COVID-19 pandemic, the students of Politehnica University of Timisoara stated that they used a laptop (72.8%), a mobile phone (17.7%) or a desktop (9%) to attend online classes [7], at the moment of this study, the laptop was used by 82.1%, the desktop by 8.6%, and the mobile phone by 7.8% of the respondents. As it can be observed, the biggest differences are found among those who currently use laptops to attend classes, their proportion being approximately 10% higher than in the previous study, with a decrease being recorded among those who, at the time, were using mobile phones.

Two other aspects of online assessment with similar values follow, namely *less stress, lack of emotions* (2.8%), and *fairness and objectivity* (2.6%). Sitting exams in the comfort of the students' own homes, or in places agreed by them, reduced much of the stress of face-to-face exams. Additionally, the evaluation being carried out on the computer imposed

the existence of a very strict grid, and some students were satisfied with this aspect, even saying that the exams were more objective or more correct.

There was also a percentage of 11.9% of the respondents for whom *there were no differences between the online and the face-to-face assessment*. Finally, 19% of the respondents provided *no answer* or provided answers that were inconsistent with the question.

4.4. Aspects of the Online Interaction with Teachers and Peers That Students Would Like to Encounter in the Face-to-Face Interaction

To the question regarding what aspect the face-to-face education would take over from online education related to the interaction with teachers, the answers are diverse (see Figure 4). For an easier follow-up, these were grouped thematically by category of answers.

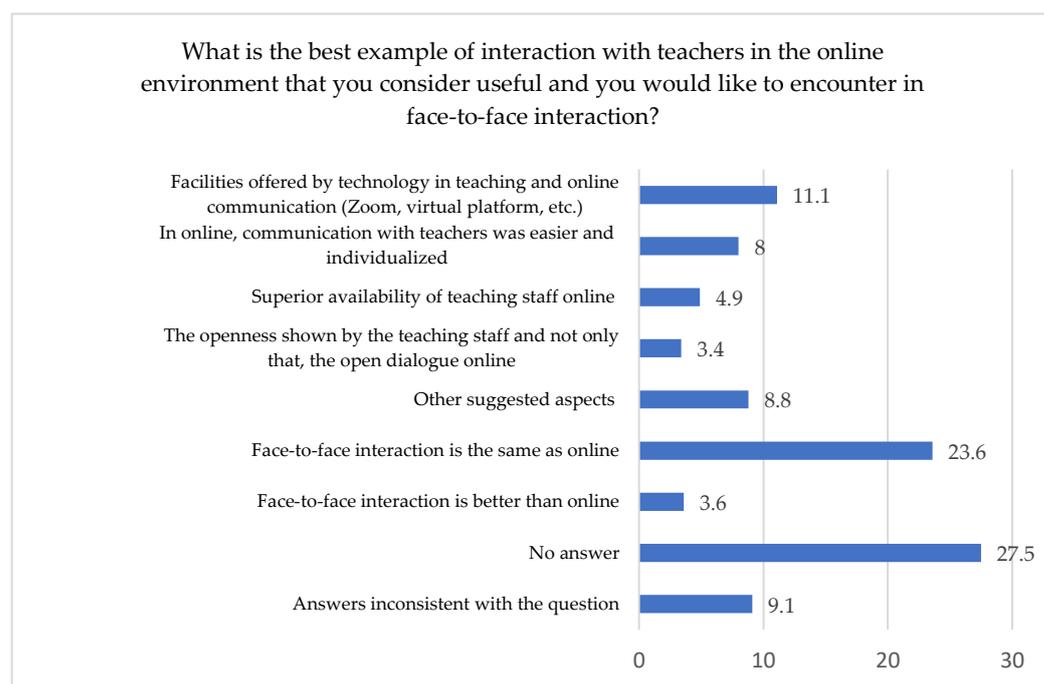


Figure 4. Aspects of online interaction with teachers, which could be borrowed for face-to-face interaction.

The first category is of those who see positive aspects in the interaction with teachers online. A total of 11.1% of the respondents believed the best thing to be the *facilities offered by technology in teaching and online communication (Zoom, virtual platform, etc.)*. As mentioned in the Introduction Section, Politehnica University of Timisoara, under discussion in this paper, has a virtual communication platform that was used before the pandemic for distance education and part-time education, and during the pandemic, its applicability was extended for all educational activities of the university. It also comes with various facilities, such as document repository, fast online communication intermediary, assessment platform, and the possibility of scheduling meetings. Online communication can take place through a variety of channels, such as emails, WhatsApp, and various social networks, which have managed to increase the speed of messages and the capacity of human interaction. Many teachers used these facilities offered by technology even before the pandemic, but now it seems that good practices in this regard can be successfully borrowed for face-to-face education. A total of 8% of the respondents consider that *online communication with teachers was easier and individualized*. A total of 4.9% of the respondents appreciated the *availability of the teaching staff online*. The *openness shown by the teaching staff and the open dialogue online* was appreciated by 3.4% of the respondents. In the *Other suggested aspects (8.8%)* category, all the answers with a frequency of less than 3% relevance for the topic under discussion were included, e.g., *the teaching and understanding of the lectures was better, better feedback*

online, greater flexibility online, and the assessment mode online, such as quizzes, was more ok. These point out to aspects that would improve face-to-face activities.

The middle category refers to those who believed that there was nothing to borrow from the online environment, or that face-to-face interaction is better than the online interaction. A total of 23.6% of the respondents considered *face-to-face interaction to be the same as online*, while 3.6% found it better than the online one.

Finally, there is the category of the people that did not answer the questions. This contains both those with non-answers and those with answers that were inconsistent with the question (bottom of Figure 4). A total of 27.5% of the respondents did not answer anything (*No answer*) or did not want to answer, while 9.1% provided answers that were evasive or unrelated to the question.

The answers to the question of what online education could bring from the interactions of peers to face-to-face education were also classified into categories for their better understanding (Figure 5).

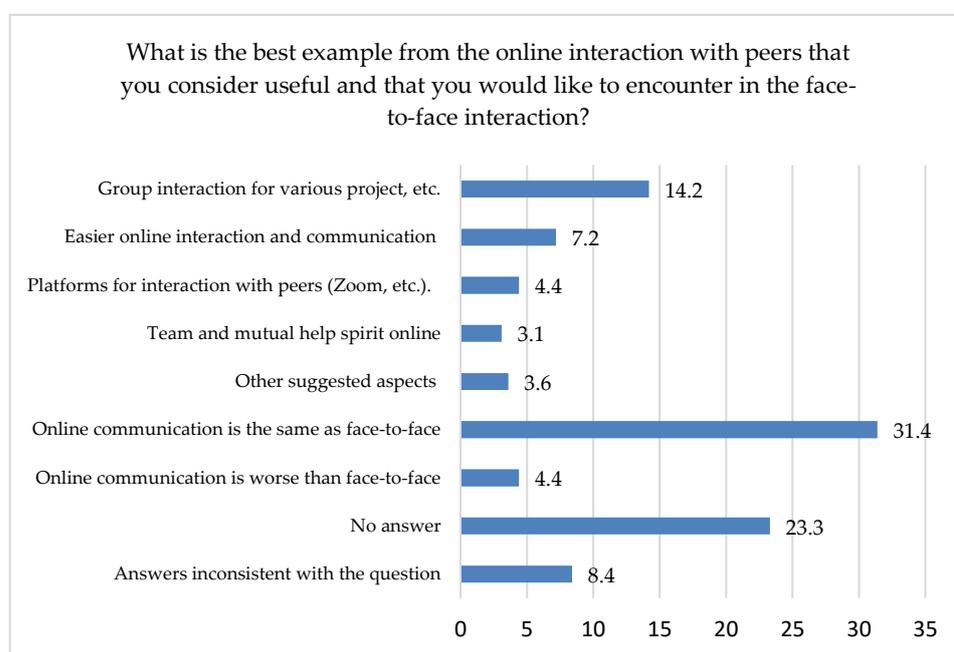


Figure 5. Aspects of online interaction with peers that could also be borrowed for face-to-face interaction.

The first category is represented by those for whom online communication with peers has several facilities that could also be borrowed for face-to-face activities. A total of 14.2%, that is, most of the respondents who value online education, do so for *the group interaction facilities for various projects*. Working for group projects required students to interact and technology enabled them to conduct this very well online. A total of 7.2% of the respondents considered *online interaction and communication easier*. A total of 4.4% of them considered *the existence of platforms for interaction with colleagues* (e.g., Zoom) as a gain of online communication, which, in addition to facilitating the performance of various activities, also a support the storing of learning materials and to complete homework. Furthermore, 3.1% appreciated that *the team and mutual help spirit developed online*, maybe because of the team-project-type activities received or as a compensation for the decrease in the help received from teachers. This category also includes *Other suggested aspects* (3.6%), which gather the responses with a lower frequency, but whose observations are not to be neglected. One example is *higher flexibility for classes in the online environment*, which refers to the fact that online students were able to better organize their own schedule following the lectures, or the practical laboratory activities. Some students appreciated the online environment for *the possibility to talk to a larger number of peers*. This may be related to

the use of online interaction platforms, such as Zoom, Google Meet, or Microsoft Team, which allow connecting large groups of people. Lectures and seminars could be provided, offering, at the same time, the possibility of interaction, even in small groups.

Another category refers to those for whom online communication is the same as the face-to-face one and those for whom online communication is worse than face-to-face. A total of 31.4% of the respondents believed that they have not found aspects of online interaction with colleagues to borrow for the face-to-face classes. A total of 4.4% considered online communication worse than the face-to-face one. These answers may belong to those students who do not prefer online activities, but rather favor direct interactions.

Finally, there is the category of non-answers or answers inconsistent with the question (bottom of Figure 5). In this case, 23.3% of the respondents did not answer the question, while 8.4% provided inconsistent answers.

4.5. Students' Perception on the Effort and the Level of Difficulty of Switching from Online Education to Face-to-Face One and the Form of Education Considered to Be More Beneficial for Their Professional Development

A first aspect targeted by this research question was to identify how difficult the subjects found the transition from online to face-to-face education. For this, a 5-step scale question was introduced in the questionnaire, where 1 represented the highest degree of difficulty and 5 the lowest. A mean value of 2.84 was recorded, with the distribution of responses being shown in the graph below (Figure 6). As it can be seen, the highest percentage was recorded by those who declared that the adjustment to the transition from online to face-to-face education was neither difficult nor easy (38.2%). For the rest of the answer options, an uneven distribution of the answers may be pointed out, in the sense that the percentages of those who said that this transition was *difficult* (37.4% obtained by cumulating the percentages of the difficult and very difficult answer variants) are higher than in the case of those who considered this transition as *easy* (24.4% as a result of summing up the percentages of the *easy* and *very easy* answer variants).

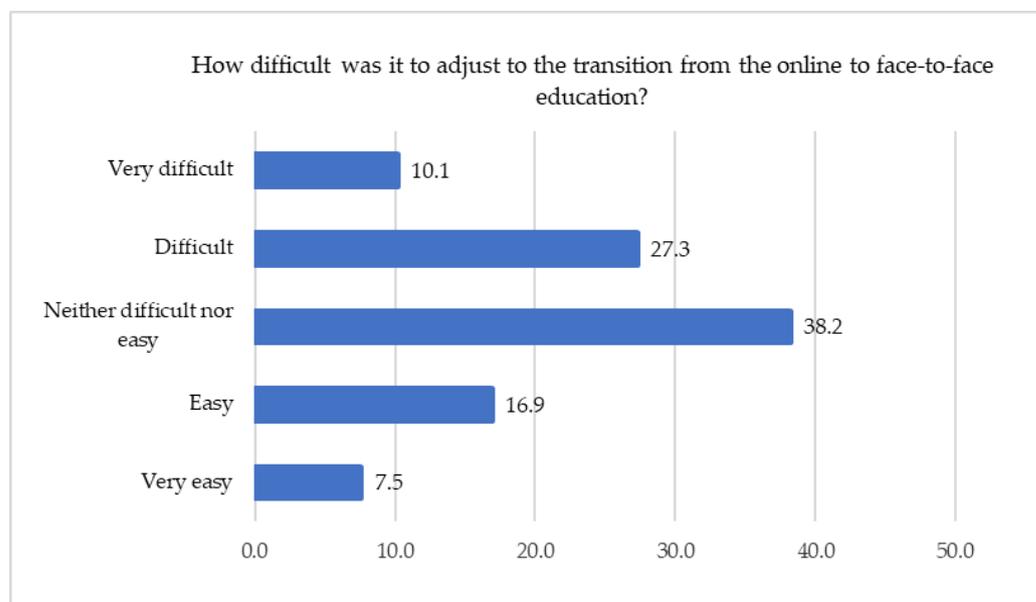


Figure 6. Assessments of the difficulty of switching from online to face-to-face education.

The students' perception regarding the workload required for online education was another aspect of the present study. Based on the obtained results, as it can be seen in the figure below (Figure 7) that almost half of the respondents (46.2%) considered it to be similar, followed by the category of those who evaluated it as higher (33.5%) and lower (20.3%).

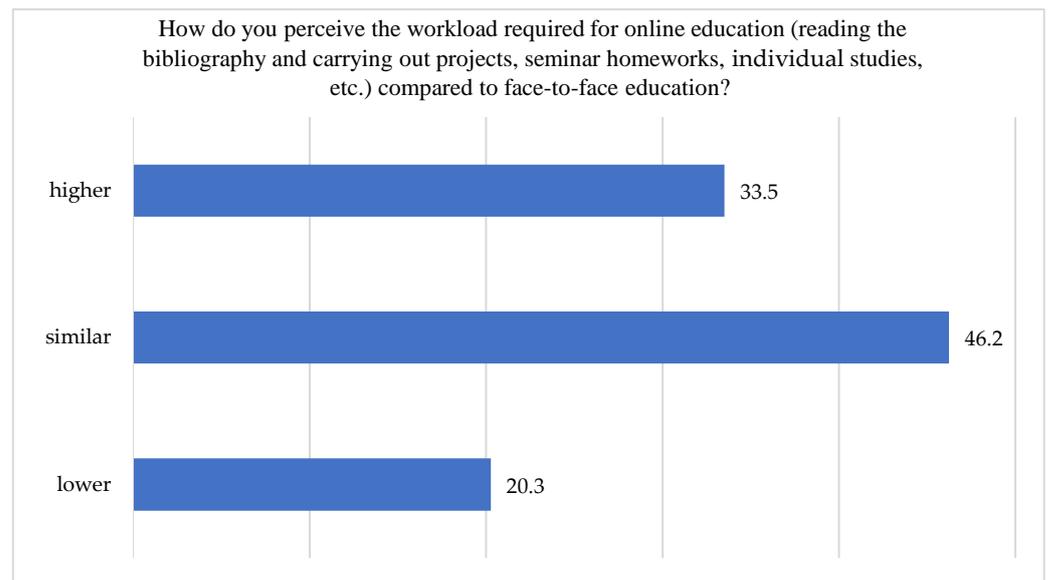


Figure 7. Ratings of the workload required by online education compared to face-to-face education.

Another question addressed to the students aimed to capture which of the two forms of education (face-to-face and online) was considered the most advantageous in terms of their professional development. As it can be seen in the figure below (Figure 8), the most answers were provided for *face-to-face education* (38.8%), followed by *online education* (34.3%) and *both* (27.0%).

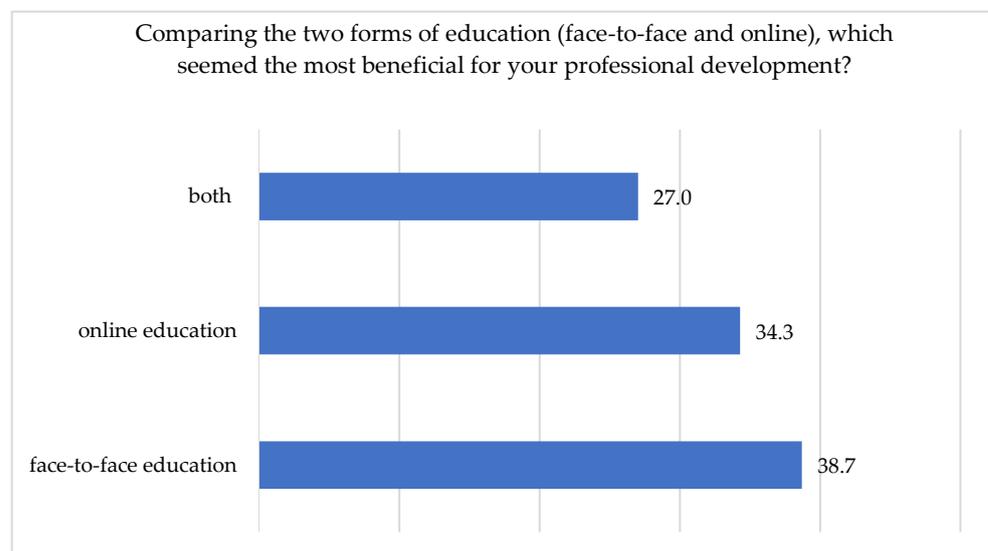


Figure 8. The most beneficial form of education for students' professional development.

This result is interesting considering that, for the question regarding the students' preferred form of education, they chose differently. A total of 53% of the respondents preferred online education, while 47% the face-to-face one.

5. Discussion and Conclusions

The transfer of lectures and practical activities of higher education into the online environment required a rethinking of the teaching strategy and a reconceptualization of teaching–learning–assessment activities. Before the pandemic, many teachers had no previous experience of online teaching because the main form of carrying out such activities was face-to-face. That is why this new form of educational activity was a challenge

for most teachers [75]. Even if the COVID-19 pandemic had an unprecedented impact on educational institutions, this research points out several aspects emerging from the educational experience in the online environment that can be used to improve face-to-face activities and lead to a more effective and sustainable education.

According to the results of the study, first of all, students would like teachers to use electronic educational resources in face-to-face **learning activities** (online materials for lectures and practical activities). These played an important role during the pandemic and were important when there was the need for adequate and useful resources to support teachers in the teaching process [76]. The number of online educational resources increased during the pandemic, they were shared through various channels and became very popular among students because they could be accessed by anyone, anywhere, and at any time [11,77]. As stated in the Introduction Section, in order to facilitate the transition to online education, Politehnica University of Timisoara used its Moodle platform dedicated to distance learning (Virtual Campus), through which it carried out synchronous and asynchronous teaching activities for all categories of students and for all study programs. The teaching staff was permanently trained on how to use this platform for teaching–learning–assessment activities and managing the communication with students, but also for employing and adapting the learning resources to the subjects they taught. The studies on the role of virtual platforms in education carried out during the pandemic [78,79] offered numerous solutions and alternatives of educational pedagogies for students and teachers to lead to effective learning [34,80–84]. Therefore, an important conclusion can be drawn, namely that, in order to ensure sustainability of the educational activity, universities should pay attention to this aspect and invest resources both in the creation of educational platforms and in the training of its teaching staff.

This statement is supported, as the results of the study show, by the students' request to use electronic educational resources in face-to-face learning activities (*online materials for lectures and practical activities*), which, in addition to *accessibility*, provide them with *more time for learning, a better assessment, and more practical aspects*. The above conclusion is also supported by the fact that students provided similar answers to the question regarding the aspects of online teaching that they would like to keep in face-to-face **teaching activities**, namely *the course materials in digital format posted on the Virtual Campus, interesting/interactive presentations, and program flexibility*.

Traditionally, the students' assessment process involves their physical presence and the face-to-face contact with the teacher. The online assessment can be a challenge for both teachers and students due to technical, academic, and ethical issues [85,86]. The present study indicates the students' desire to be assessed through *online quizzes* or through *the creation of projects or other types of practical activities*. These offer the *advantage of speed, flexibility, and quick feedback*. Moreover, there is a preference for *open book assessments*, which provide the possibility of access to educational resources. As a conclusion, it is worth highlighting the idea of developing such **assessment** tools, but also to overcome the barriers and problems of their implementation in the online environment. Conducting qualitative analyses among the teaching staff could lead to solutions for improving the assessment process.

Regardless of how the students receive the informational content, in the online environment, the process is based on the interaction with peers, teachers, and the informational content provided by them [87]. Numerous studies have investigated the obstacles faced by teachers in interacting with students in the online environment, e.g., their low technological literacy, lack of knowledge of the psychological implications of using technology in teaching, and the absence of digital resources [88,89]. The present analysis points out several positive aspects of the **interaction with teachers**, such as the facilities offered by *technology in teaching and online communication* (Zoom, virtual platform, etc.), *online communication with teachers was easier and individualized, availability of teachers in the online environment, the openness shown by teachers, and the open dialogue online*. This could have been interpreted

with intergenerational institutional embeddedness, which can be a significant supportive factor in the learning process (both online and offline) [90].

As regards the interaction with peers, students do not dislike online interaction, as they can also encounter the face-to-face collaboration in the online environment through joint projects, forums, chats, etc. [91]. The present study indicates some aspects considered useful for face-to-face activities by the students, such as *group interaction for various projects, easier interaction and communication in the online environment, team and mutual help spirit developed online*. Positive characteristics of the online interaction with peers were considered to be the *flexibility for longer hours online* and *the ability to talk to a larger number of peers through technology*. This statement is related to intergenerational embeddedness, which is worth mentioning in this case [92].

The distribution of the answers regarding the perception of the effort and the level of difficulty of switching from the online education to the face-to-face one and considered to be the most beneficial in terms of the students' professional development can lead to the idea of adopting a blended learning solution. As a new era is coming in which the online tools will be perfected since technology-enhanced learning will be integrated in higher education, blended learning seems to be gaining ground among students' preferences for future studies. For instance, research shows that tertiary college students in the Philippines opt for blended learning (a combination of traditional classroom training and online activities) for the post-pandemic and future career education as it improves their satisfaction and retention and helps them to socialize at the same time [93]. Other researchers also advocate for blended learning as the future of higher education [94]. They argue that, in addition to some of its clear benefits, e.g., easier access to educational content and better communication between students and teachers, in the post-pandemic context, there is a need for "a new pedagogic order" [86], as it includes technology and also caters for students' individual needs. The respondents in another study, in higher education (college and university educators, students, senior administrators, and instructional design specialists) and from six countries, also foresee a major growth in the blended learning after the pandemic, with only three-quarters of faculty and students expecting to take or teach fully online courses after the pandemic [95].

The present study, therefore, helps stakeholders (i.e., university management and teachers) to understand the needs and perceptions of students in order to plan and succeed in adopting sustainable measures to implement such educational scenario. To provide an effective blended learning (BL), the best practices for creating academic programs of this type [96] that create a perfect balance between face-to-face and digital education [97] will have to be taken into account.

6. Limitations

Although the study offered some answers to questions regarding the aspects of online education that are also preferred in face-to-face education, there are some limitations to the analysis conducted, these being the limited geographical area (only the city of Timisoara), the size of the sample, and the fact that only the perspective of the students from Politehnica University of Timisoara was taken into account. It is likely that this university possesses a particular situation, considering the way in which the online education process was organized during the COVID-19 pandemic (especially the use of the Virtual Campus), and the fact that the university is a technical one. Starting from the recorded results, the research team aims to conduct a series of qualitative analyses leading to a better understanding of the studied subject. In addition, it would be necessary to expand the quantitative research and increase the database by carrying out comparative studies with other universities in the country. Furthermore, the studied aspects, i.e., learning, teaching, assessment, and interaction with peers and teachers, could be further researched so that they lead to solutions for a more efficient and sustainable education, adapted to its beneficiaries' needs. These conclusions will outline a better picture of the pre- and post-pandemic education, with improvement indicators for all the forms of education.

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