Student Perceptions of Online Education and Digital Technologies during the COVID-19 Pandemic: A Systematic Review

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Abstract: We designed a bibliometric review combined with a systematic review of relevant research on student perceptions of online education, which was conducted from March 2020 until September 2022 (focused on emergency remote teaching). By exploring the Scopus and Web of Science (WoS) databases, we selected 154 articles addressing mostly positive/negative as well as neutral student perceptions. The methodology followed the Khan five-step approach and included a PRISMA flowchart integrating keywords for selecting the relevant quantitative data for the analysis. Evidence was brought forward identifying the advantages of online education based on efficiency-related factors, contributing to the supportive attitudes of the learners (digital technology application, self-directed learning and flexibility). Our analysis revealed that the pursued research field is still insufficiently explored. Universities must prepare more consciously for embedding current technological challenges to cope with unforeseen situations, such as an immediate switch from the classic face-to-face teaching to online based on digital technology education. The greatest challenge for the universities in the digital society is given by the just-in-time, flexible adaptation to the unplanned situations. Therefore, universities must always be prepared to make the switch from offline to online and vice versa—at the same time, guaranteeing the quality of teaching processes and student satisfaction. Future trends in education reveal the role of digitalization of the educational sector in integrating innovative technologies in the educational curriculum and calls for a new pedagogical approach that is centred on learners' self-directed learning, collaborative learning and the cognitive and social presence of students and teachers. The most important contributions of the paper reside in an in-depth analysis of student perceptions of online education processes and their perceived advantages and disadvantages related to online learning experienced during the COVID-19 pandemic. These advantages were analysed against efficiency-related factors, and, among them, the "application of technologies" is considered relevant for a niche investigation of the technology acceptance model (TAM).

Keywords: online education; emergency remote teaching (ERT); student perceptions; efficiency-related factors; technology acceptance model (TAM); higher education institution (HEI)

1. Introduction

The COVID-19 pandemic impacted the educational environment around the world. Mankind experienced an immediate switch to online teaching, out of necessity, during the global lockdowns [1]. The abrupt adoption of emergency remote teaching (ERT) by most HEIs was meant to ensure the continuity of learning. From isolated and limited use of ERT before the pandemic, global educational systems have changed to extensive and intensive use of this form of teaching.

The pandemic management has already included lockdowns, as well as mobility restrictions, alternating with lifting schemes for returning to normal and has triggered

many vulnerabilities particularly in emerging economies, such as low capital investment level, the rise of unemployment, the dramatic decrease of contact-intensive services key to the tourism and travel sectors as well as the hospitality industry and reduced access to distance learning [2,3]. Therefore, "If history is anything, unless there are substantial and effective reforms, the global economy is heading for decades of disappointing growth. Given the weak financial situation and the increase in debt, institutional reforms to stimulate growth are particularly important. It is necessary to make comprehensive policy efforts to restore robust, sustainable, and equitable growth" [4] p.28.

To contain the spread of COVID-19, many countries closed campuses and schools, moving to remote learning, where available. According to UNESCO data [5,6], in March 2020, due to global lockdowns, 82.8% of the total number of students enrolled (pre-primary, primary, lower-secondary, upper-secondary, and tertiary education levels) in 166 closed units were directly affected by the lack of access to in-person education. One year later, in March 2021, the situation improved significantly, with 147,171,570 affected learners, representing 8.4% of total enrolled learners, in 30 countries that opted for wide closure. In 2022, we acknowledge that, at the global level, we still have affected learners (according to UNESCO, at the end of February 2022, while most countries have fully opened schools, 42 countries have opened schools partially, and 6 countries still have their schools fully closed).

Along with the gradual lifting of the restrictions, HEIs have started to implement hybrid teaching and learning in search of a sustainable innovative approach to educational processes [5–7]. HEIs with resilient adopting behaviour have started to analyse how the online educational skills and expertise accumulated during the pandemic can be preserved or included in new educational formats.

The changes induced by the latest health crisis in the educational environment are reflected in the most relevant literature resources available in international databases. The review aims to systematically account for the available literature on the advantages and disadvantages as perceived by students. To this end, we selected and analysed recently published scientific articles on the prospects and impact of e-learning on higher education during the COVID-19 pandemic from the two most prestigious international databases: Web of Science (WoS) and Scopus. The chosen time frame was April 2020 to September 2022 as the pandemic begin officially on 11 March 2020 [8].

Moreover, we intend to present the most relevant perspectives and approaches useful for short-term adaptability reasons and as long-term improvement needed actions. Therefore, the novelty of the paper derives from an in-depth analysis of the student perceptions of online education processes and their perceived advantages and disadvantages related to online learning as experienced during the COVID-19 pandemic.

2. Materials and Methods

Systematic literature reviews (SLR) are valuable tools that support researchers in accessing relevant synthesis of state-of-the-art scientific literature, in identifying new potential research topics, in evaluating existing theories and in identifying ways of development and to advance knowledge. SLR are considered relevant in social sciences research as important tools for advancing research and supporting decision-making process, as well [9,10]. According to Glass [11], meta-analysis represents secondary research performed for the purpose of synthesizing the research results of certain fields. The essential outcome of meta-analysis is the scientific rigor associated, conferred upon the process of systematization of research literature, implicitly allowing the accumulation of empirical evidence in a particular area of research [12].

The PRISMA method is considered one of the most efficient tools for creating valuable systematic reviews in various scientific domains. It supports researchers to present in a transparent manner "why the review was done, what the authors did, and what they found" [13].

For our quantitative and qualitative literature review, for August to September 2022, we followed the five-step approach as defined by Khan et al. [14]: framing the question, identifying the relevant work, assessing the quality of the studies selected, summarizing the evidence, and interpreting the findings.

3. Results

3.1. Framing the Question

For our analysis, the research question is the following: How is the online education perceived by students in higher education? (Positive, negative, both positive and negative or neutral?).

We aimed to explore student perceptions of online education, from the ERT as a matter of necessity during campus closure and restricted access to online education formats as a matter of choice in the more relaxed health context.

3.2. Identifying the Relevant Work

We explored two databases—namely, the Web of Science and Scopus. In searching for scientific articles, we were interested in how online education is perceived by students (positively, negatively, both positively and negatively or neutral). We searched for relevant scientific works on the advantages and disadvantages of online education—again, focusing on student perceptions. In the selection stage, the following criteria were considered (see Figure 1):
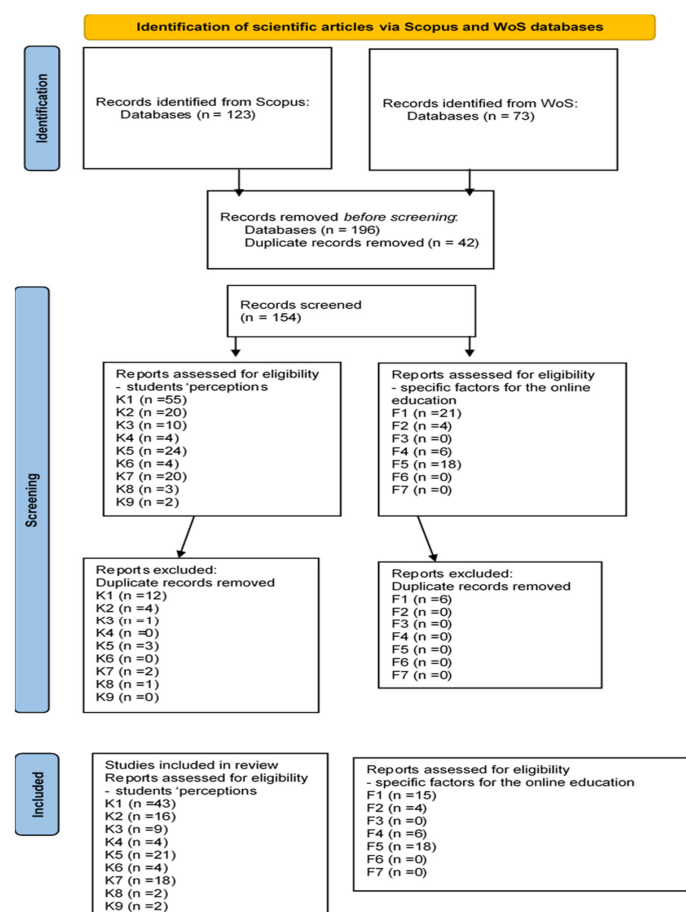
Note: K1: positive; 2: negative; K3: positive and negative; K4: neutral; K5: advantages; K6: advantages (positive); K7: disadvantages; K8: disadvantages (negative); K9: positive and negative (advantages and disadvantages); F1: Flexibility; F2: Accessibility; F3: Student-centred education; F4: Self-directed learning; F5: Collaborative learning; F6: Diversified learning; F7: Application of technology.

Figure 1. Prisma flow chart: student perceptions of online education. Source: authors' own analysis.

- Select only full versions of English scientific articles.
- Publications should be included and indexed in the Web of Science and Scopus databases.
- All selected papers should respond to the following searched terms: 'students' teaching—learning preferences', 'students' perceptions of online education', 'online higher education advantages (cost/benefits, pro/cons)', 'online higher education disadvantages', 'digital learning in higher education', 'e-learning in higher education', 'emergency remote teaching', 'learners' experience', 'self-directed learning', 'students digital skills', 'interactive teaching methods', 'online educational tools', 'teachers digital skills', 'online assessment' and 'virtual learning environments'. For online education, we also used alternative labels, such as virtual education, remote education, and digital education.
- The search criteria were connected to the title, abstract and keywords in both databases.

Student perceptions of online education are relevant for the successful implementation of this form of education, which means that positive perceptions contribute to the acceptance of online education as an efficient, modern, and relevant means of education. Studies on the efficiency of online education revealed some of the most relevant prerequisites for sound implementation of online education: (1) well-designed course content, (2) motivated interaction between the instructor and learners, (3) well-prepared and fully supported instructors; (4) creation of a sense of online learning community; and (5) rapid advancement of technology [15] p.159 as well as some efficiency-related features: flexibility, accessibility, student-centred education, self-directed learning, collaborative learning, diversified learning and technology application [16].

3.3. Assessing the Selected Quality of the Studies Meant Establishing Both Inclusion and Exclusion Criteria

The investigation was conducted according to several inclusion and exclusions criteria, presented in Table 1.

Table 1. Inclusion and exclusion criteria.

Inclusion Criteria	Exclusion Criteria
- Online education. - Full version of scientific papers published in journals. - Language of the papers: English. - Studies that used methodology; qualitative, quantitative, or mixed method. - Studies that access and evaluate perceptions of online education during COVID-19. - Peer-reviewed journal articles.	- Face-to-face education. - Full version of non-English scientific articles. - Studies that did not use methodology; qualitative, quantitative, or mixed methods. - Studies that do not evaluate the perception of e-learning during the COVID-19 pandemic. - Articles published before the official start of the COVID-19 pandemic according to the World Health Organization (11 March 2020). - Manuscripts published as reports, books, chapters, conference proceedings, etc.

Source: authors' own selection.

The reason that we decided to use the VOSviewer software was to create bibliometric networks (see Figure 2) starting from the final database created and used throughout the entire research. The networks were generated to identify existing correlations based on indicators, such as citations, bibliographic couplings, co-citation or co-authorship relations and text mining functionality that can be used to construct and visualize co-occurrence networks of important terms extracted from the analysed database.
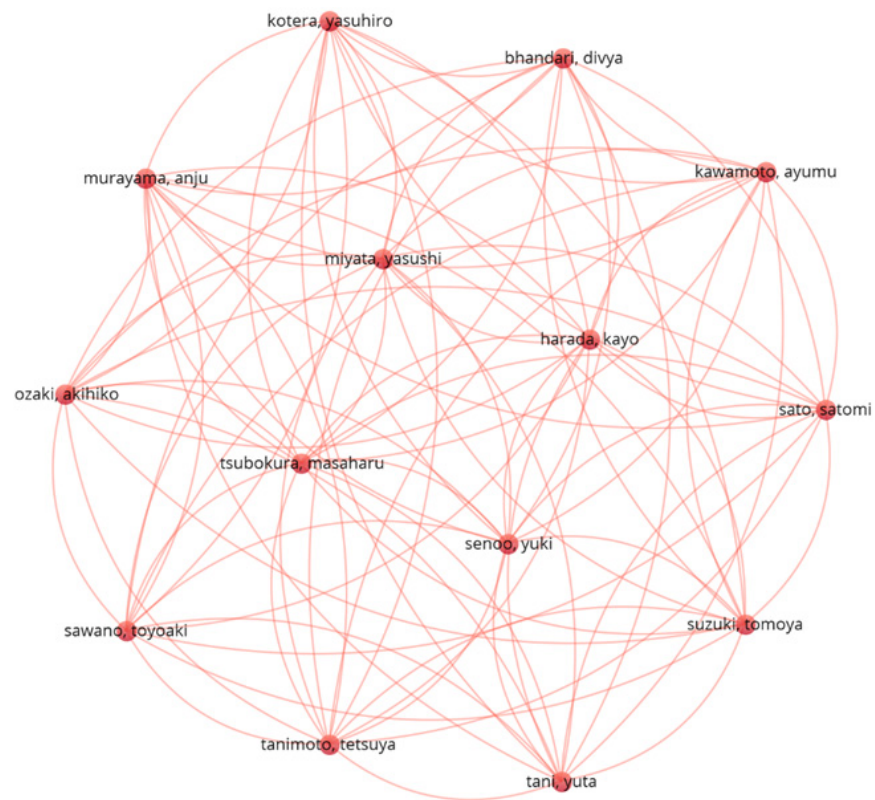
Figure 2. VOSviewer mapping of student perceptions of online education regarding co-authorship. Source: authors' own analysis with VOSviewer.

The image attempts to capture the linking networks established between the authors with at least one relevant connection between them (see Figure 3).
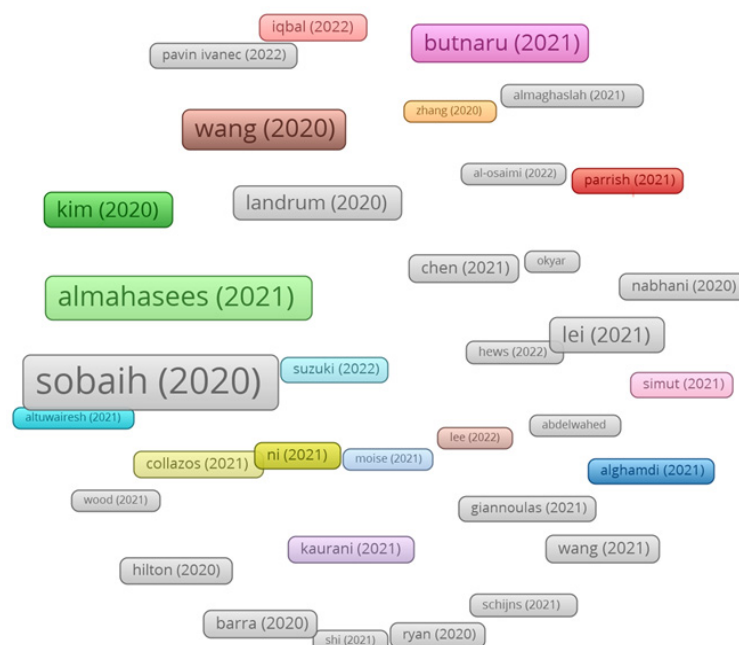

Figure 3. VOSviewer mapping of student perceptions of online education regarding citations. Source: authors' own analysis with VOSviewer.

Once published, the articles are gained interest among researchers interested in the topic, interest reflected here in the number of citations (see Figure 4).
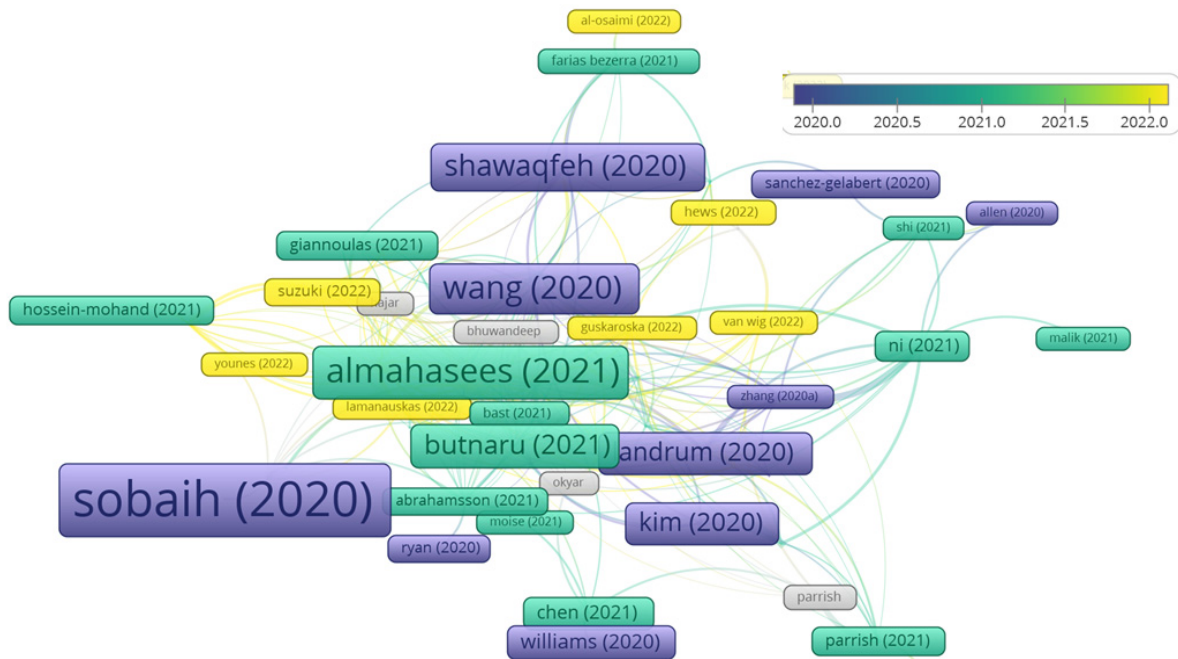

Figure 4. VOSviewer mapping of student perceptions of online education with respect to bibliographic coupling. Source: authors' own analysis with VOSviewer.

Bibliographic coupling provides a deeper perspective on the scientific activity of the researchers in the field and the way they design connections among the existing literature. This also underlines the visibility of the articles and the size of the research community involved in the topic (see Figure 5).
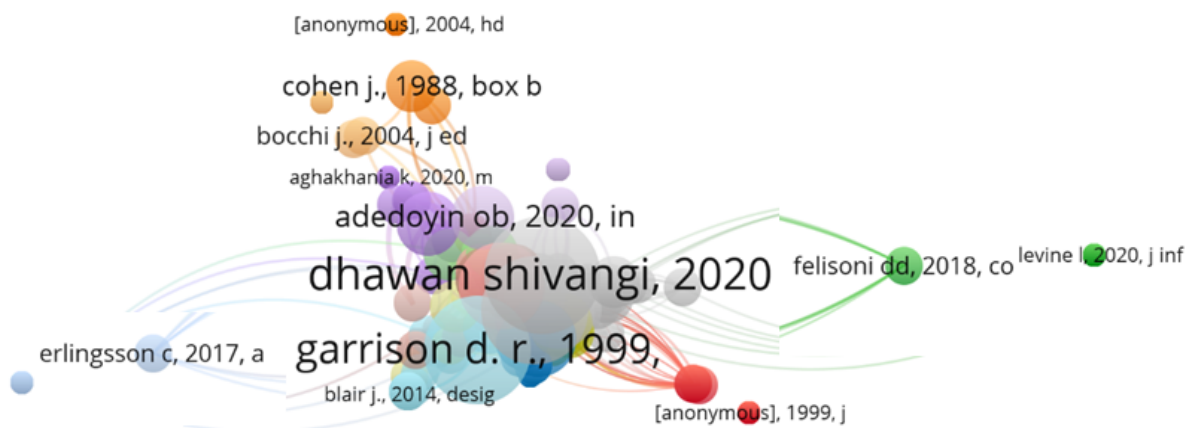

Figure 5. VOSviewer mapping of student perceptions of online education regarding co-citation/co-citation-cited sources. Source: authors' own analysis with VOSviewer.

The created network is based on nodes and links generating a frame showing modifications that are taking place in time. The number of nodes is based on the number of citing and cited articles (see Figure 6).
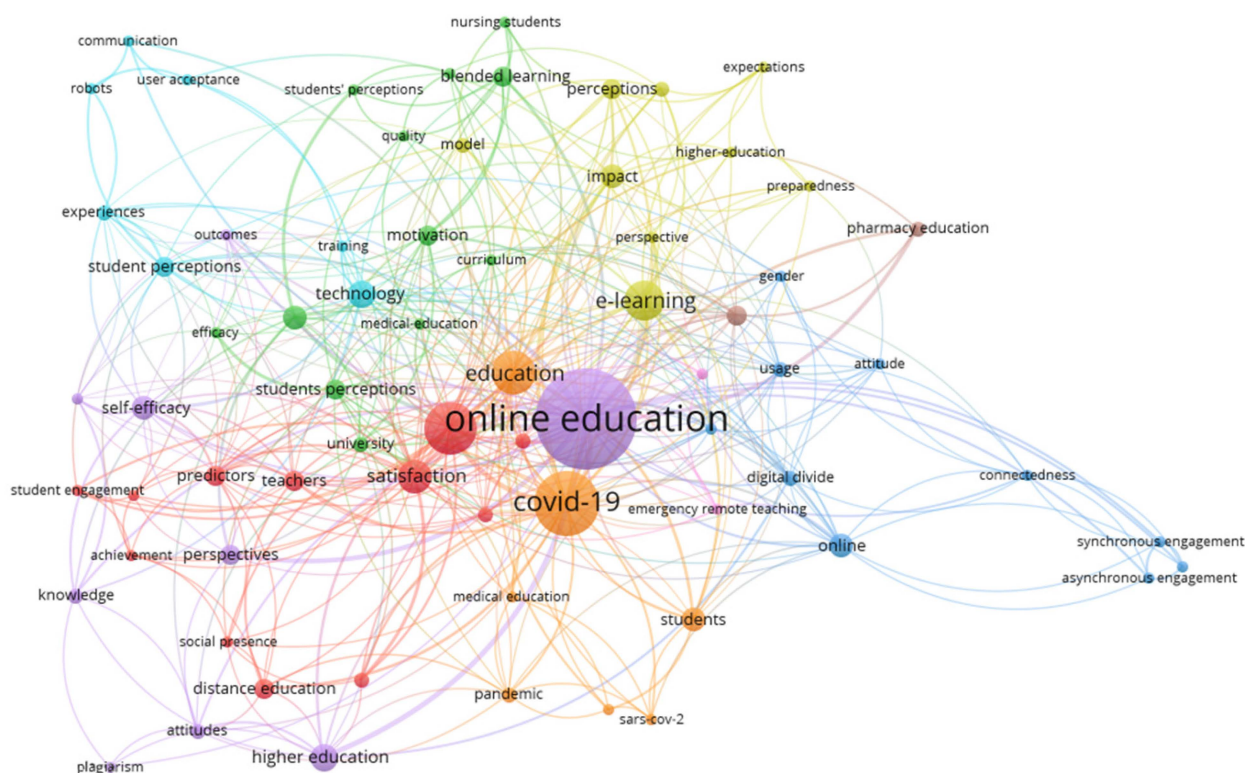
Figure 6. VOSviewer mapping of student perceptions of online education with respect to co-occurrence. Source: authors' own analysis with VOSviewer.

The co-occurrence matrix is based on the most frequently used keywords by researchers in the field revealing the main topics of interest defining the investigated framework.

3.4. Summarizing the Evidence and Interpreting the Findings

This systematic review builds upon scientific articles written in English between 2020 and 2022 addressing student perceptions of online education. Our review of 154 articles retrieved from the Scopus and Web of Science databases concentrated mostly on the positive/negative as well as neutral student perceptions with limited attention given to teacher and/or other higher education stakeholders perspectives. Using the filters 'students' perceptions' and 'online education', 123 scientific articles were identified in Scopus and 72 in WoS. After merging the two databases, 41 duplicates were removed, and the output consisted of 154 scientific articles in English.

While analysing the topics of these papers, we found that 42 articles focused on positive perceptions (12 duplicates were removed), while 16 focused on negative perceptions about 'online education'. We identified nine articles that explored both positive and negative ones, while four revealed neutral perceptions among students. For more information related to positive perceptions, we searched for perceived advantages of online education. These advantages were analysed against efficiency characteristics of 'online education'. Furthermore, we filtered the relevant output and performed a qualitative evaluation by categorizing the resulting findings. Then, we focused on data processing and interpretation.

The analysed database consists of 42 articles focused on positive perceptions, 16 on negative perceptions and 9 articles on mixed perceptions (see Table 2). As mentioned, positive perceptions of online education were identified in 42 articles, out of which, we checked how many of them explored the advantages (we also used, as search terms, benefits/gains) associated with 'online education', and the quantitative analysis revealed that only two articles out of 42 (Table 2) addressed both the gains and the limits of 'online education'.

Table 2. Literature focusing on students' positive perceptions of online education.

Factors	References
K6: advantages (within positive student perceptions of online education)	Abdelwahed et al. [17]; Aloreafy & Saaty [18]; Anwar et al. [19]; Barra et al. [20]; Chen et al. [21]; Dhakal et al. [22]; Elashhab [23]; Fernandez et al. [24]; Hilton et al. [25]; Huh et al. [26]; İnan-Karagül & Şeker [27]; Ivanec [28]—'benefits and limits'; Kane et al. [29]; Kaurani et al. [30]; Kayyali et al. [31]; Khan et al. [32]; Kim et al. [33]; Landrum [34]; Laurens-Arredondo [35]; Lebens [36]; Mao et al. [37]; Mayordomo et al. [38]; Metz & Metz [39]; Moorberg et al. [40]; Okyar [41]; Pokryszko-Dragan et al. [42]; Robson & Mills [43]; Ryan et al. [44]; Sánchez-Gelabert et al. [45]; Sarkar et al. [46]; Shawaqfeh et al. [47]; Shree et al. [48]; Suzuki et al. [49]; Tiedt et al. [50]; Tóth et al. [51]; Uspabayeva et al. [52]—'benefits and limits'; Van Wig et al. [53]; Wang et al. [54]; Williams et al. [55].
F1: Flexibility (6.13%)	Alnajjar et al. [56]; Barra et al. [20]; Huh et al. [26]; Kane et al. [29]; Shawaqfeh et al. [47]; Suzuki et al. [49].
F2: Accessibility (3.6%)	Anwar et al. [19]; Khan et al. [32]; Moorberg et al. [40].
F3: Student-centred education (2.4%)	Landrum [34]; Mshayisa [57].
F4 self-directed learning (10.22%)	Abdelwahed et al. [17]; Alnajjar et al. [56]; Fernandez et al. [24]— 'more autonomy'; Hilton et al. [25]— 'self-regulated learning'; İnan-Karagül & Şeker [27]— 'self-regulated learning'; Ivanec [28]— 'difficulties for self-regulated learning'; Landrum [34]—'self-regulated learning'; Mayordomo et al. [38]; Mshayisa [57]; Pokryszko-Dragan et al. [42]—'difficulties for self-regulated learning'.
F5 collaborative learning (4.9%)	Kane et al. [29]; Mshayisa [57]; Tiedt et al. [50]; Van Wig et al. [53].
F6 diversified learning (3.7%)	Fernandez et al. [24]— 'balanced learning'; Mshayisa [57]; Tiedt et al. [50].
F7 Application of technology application (18.39%)	Abdelwahed et al. [17]; Aloreafy & Saaty [18]; Anwar et al. [19]; Barra et al. [20]; Choi et al. [58]; Elashhab [23]; Hilton et al. [25] 'technical skills, technical support'; Kayyali et al. [31]; Kim et al. [33]; Landrum [34]; Lebens [36]; Metz & Metz [39]; Mshayisa [57]; Okyar [41]; Robson & Mills [43]—'technical skills, technical support'; Sarkar et al. [46]; Tóth et al. [51]; Van Wig et al. [53]; Wang et al. [54].

Note: in brackets the reported efficiency-related factors in percentages. Source: authors' own compilation.

Most of the authors focused on technology application (the immediate switch to ERT challenged both students and teachers worldwide; therefore, the high research interest is self-explanatory: at the global level, HEIs were forced to support the immediate transition from occasional and limited use of technology [59,60] in teaching–learning processes to exclusively online education, mediated by technology). Innovative technologies applied in

teaching–learning activities might be considered a driving factor for online education by students who embrace digitalization and master digital skills [61,62].

Hollnagel [63] identified that "students generally indicated more merit, comfort level, task-technology fit and satisfaction than their instructors". During the pandemic, researchers approached the topic of positive perceptions of 'online education' using the technology acceptance model (TAM) [64–68]. In our combined database, we retrieved 11 articles that addressed the TAM in mostly quantitative but also qualitative and combined quantitative–qualitative studies (see Table 3).

Table 3. Studies exploring the technology acceptance model (TAM).

Reference/Source	Research Problem/Scope	Qualitative/ Quantitative Method	Main Results
Laurens-Arredondo [35]	The relationship between motivation and meaningful learning for university students.	Quantitative	Positive relationship between the participation in Mobile Augmented Reality (mRA) experiences and the meaningful learning, given the high degree of acceptance and stimulation of motivation.
Bast [69]	Student perception towards online learning (technology-receptiveness).	Quantitative	Receptiveness towards online learning significantly higher for students from urban areas compared with rural areas.
Parrish et al. [70]	Student perceptions of an online team-based learning course design	Quantitative	Both positive (increased learning, efficient teamwork, and instructor's guidelines) and negative (significant workload, time-consuming activities) perceptions of online tools.
Chen [71]	Student engagement, learning outcome and student perceptions of an online courses	Quantitative	Students engaged themselves actively in all the online learning activities and had gained high scores in all tasks, quizzes, and tests. In addition, students held positive perceptions towards the formative assessment.
Kim et al. [33]	Student perceptions about artificial intelligence (AI) teaching assistants in higher education by use of an online survey.	Quantitative	Perceived usefulness of an AI teaching assistant and perceived ease of communication with an AI teaching assistant

Table 3. *Cont.*

Reference/Source	Research Problem/Scope	Qualitative/ Quantitative Method	Main Results
Van Wart et al. [72]	Critical success factors for online learning from the students' perspective and then determines their hierarchical significance.	Quantitative	Students embracing online courses on their own merits manifested higher relevance for these factors, while students preferring face-to-face manifested lower.
Landrum [34]	Student confidence regarding their ability to use online learning platforms, utilize self-regulation strategies and their confidence in their ability to learn in online classes	Quantitative	Exploring student purposes and reasons for taking online classes are relevant for assessing evaluations of online classes.
Uspabayeva et al. [52]	Student perceptions of the Internet of Things (IoT) in the evaluation of new trends in education.	Qualitative	Positive opinion about the use of IoT applications in education.
Chandra et al. [73]	Students' apprehensions, satisfaction and experience concerning online hospitality and tourism education (HTE)	Combination of qualitative and quantitative	The importance of practical labs and instructions sessions for students; satisfaction level.
Almahasees et al. [74]	Factors affecting the adoption of digital technologies in developing countries	Combination of qualitative and quantitative	Adoption related factors: lack of ICT infrastructure, lack of technical and managerial support and lack of computers and e-learning knowledge among facilitators.
Kundu & Bej [75]	Indian student perception of readiness for sudden shift to online education	Combination of qualitative and quantitative	Students were neither satisfied nor ready for this sudden shift toward online education rather they felt fear, uncertainties, and several challenges due to digital divide

Source: authors' own analysis.

In these articles, the main findings revealed mostly positive perceptions of online education due to the use of innovative technologies: mobile augmented reality in Laurens-Arredondo [35], Internet of Things in Uspabayeva et al. [52], machine teachers and artificial intelligence assistants in Kim et al. [33], new educational platforms in Landrum [34]. Two studies revealed a preference for blended learning, encompassing online technologies in the teaching–learning processes [73,74], while the other two stressed that cognitive

presence, social presence, and teacher presence are key factors for students embracing online education and innovative technologies [70,72].

The second research direction is related to self-directed/self-regulated learning (online education asks for self–education skills and contributes to Parr learners' autonomy [76–78], while the third refers to the flexibility of online educational formats that allows for self-paced learning processes, granting the learners a more balanced approach of the learning processes (for example Anwar et al. [19] found that flexibility of the learning process is perceived as relevant by the students involved in the study, and Barra et al. [20], explored the pros and cons of flexibility, considering the efforts needed to ensure flexible teaching–learning formats. As far as the other efficiency-related factors are concerned, our analysis of the selected articles revealed that, throughout the pandemic, they have not won over the researchers' interest; therefore, further investigations are needed soon (to analyse if the ERT formats and more sustainable online education formats meet these efficiency-related criteria for successful learning processes).

As far as negative perceptions are concerned, we performed a qualitative analysis within the initial article database. Of the 16 articles (see Figure 7), we removed two, due to their topical irrelevance, as they addressed the negative perspectives on the considered subject among the 14 articles, we discovered that technical challenges faced by learners: access to technology, limited digital skills [36,41,49] and limited or lack of regular communication with teachers and colleagues [79–81] are relevant disadvantages of online education, leading to negative student perceptions, attitudes and/or behaviours [82,83]. However, mental-related problems were investigated: high stress and anxiety, emotional distress, fear, and isolation [41,81,84,85]. Most studies were conducted during lockdowns, therefore, focusing on early developments of the pandemic.
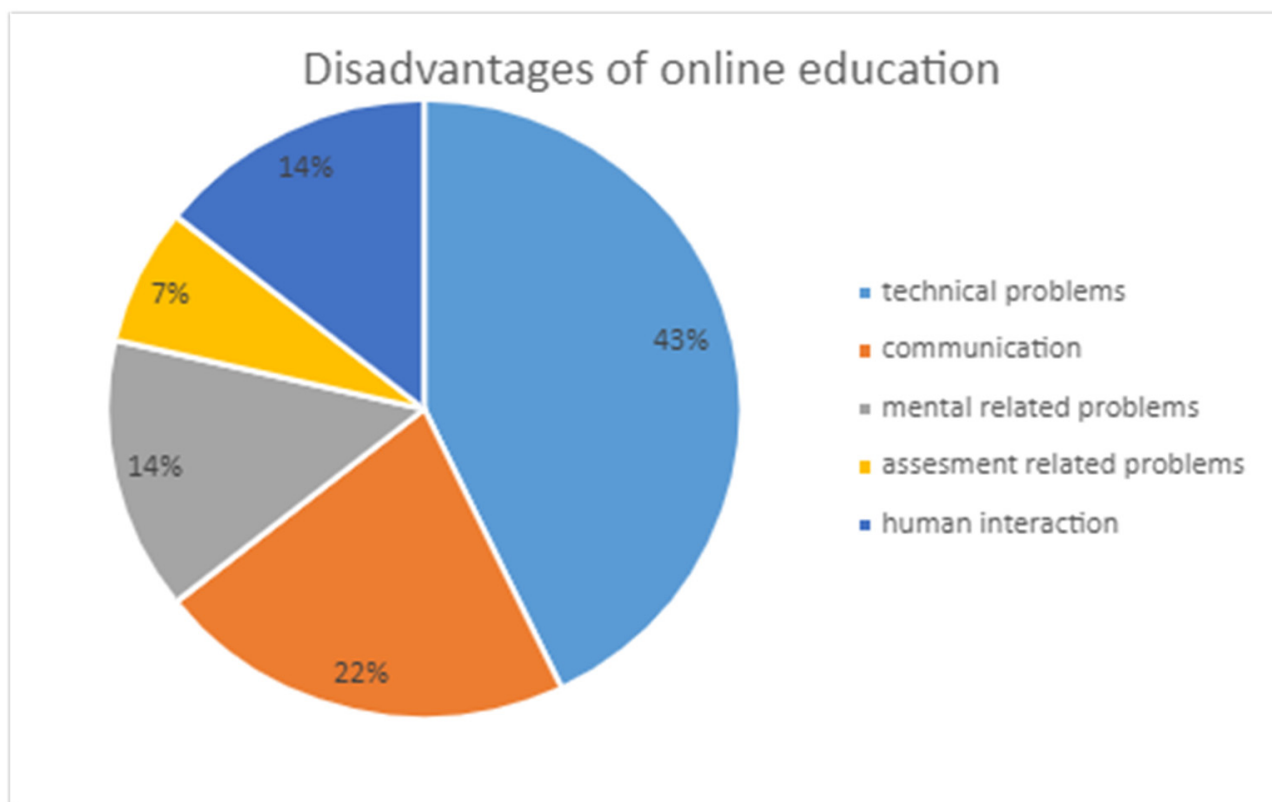

Figure 7. Disadvantages of online education. Source: authors' own analysis/compilation.

As far as mixed perceptions are concerned, our analysis revealed the following specific factors (see also Table 4):

(a) Positive related ones: new technologies contribution, flexibility, pedagogical quality, and sense of comfort.

(b) Negative related ones: emotions, accessibility and connectivity, technical problems, unsatisfactory content, lack of social interactions and increased self-learning effort.

(c) Dual perception of factors: feedback, such as [31], as a learning tool [38], related to synchronous and asynchronous activities [24], weak feedback [38] and flexibility, such as [49], time flexibility [40,42,49], commuting time to school and associated stress [49].

Table 4. Studies exploring both positive and negative factors concerning online education.

Reference	Positive Related Factors	Negative Related Factors
Laurens-Arredondo [35]	new technologies	accessibility and connectivity
Kim et al. [33]		
Mayordomo et al. [38]	feedback as a learning tool	emotions, reduced feedback
Fernandez et al. [24]	feedback related to synchronous and asynchronous activities	
Kayyali et al. [31]	feedback	
Lebens [36]	technical skills progress	accessing technology
Suzuki et al. [49]	time-flexibility upgraded digital skills flexibility	commuting time to school and associated stress accessibility and a lack of digital skills unstandardized teaching skills
Pokryszko-Dragan et al. [42]	time flexibility enhanced pedagogical quality a sense of comfort computer competences	accessibility unsatisfactory content lack of social interactions
Moorberg et al. [40]	flexible working hours	accessibility and connectivity increased self-learning effort

Source: authors' own analysis/compilation.

Neutral perceptions were identified by the literature [86,87]—the authors focused only on ERT during the early stage of the pandemic), while others investigated the efficiency of the use of e-books and its impact on student engagement [88]. Ni et al. [89] pinpointed several quality factors of online education as perceived by students, whereas student perceptions revealed both positive and negative insights into the teaching–learning processes [31]. Their research focused on the design and examined the playability and perceptions of DOSE (a serious game tool) within healthcare curricula.

During lockdowns and in the context of ERT, universities opted for digital platforms that offered support for synchronous activities that were concerned with student access to learning activities (universities' main goal was ensuring learning continuity). As the pandemic evolved, more attention was given to platforms that could provide support for both synchronous and asynchronous activities, with students becoming more familiar with digital tools and self-learning (see Table 5).

Table 5. Studies exploring digital platforms for synchronous and asynchronous activities.

Reference	Synchronous Activities	Asynchronous Activities	Digital Platforms Analysed
Zhao [90]	X Google Hangouts X	X Google Classroom X X	Google, Microsoft Teams, Moodle Skype
Chaka [91]	X		Microsoft Teams, Moodle Zoom
Chakraborty et al. [92]	X		Google Meet, Zoom, Microsoft Teams
Kansal et al. [93]	X		Microsoft Teams, Google Classroom, Zoom, WebEx
UNESCO [94]	X		Microsoft Teams, Moodle Zoom

Source: authors' own analysis/compilation.

4. Discussions

4.1. Positive Impacts of Online Education during Pandemics

The current research referred to the benefits of technology application in the context of the immediate switch to ERT. Innovative technologies applied in teaching–learning activities are at the forefront of student acceptance of new educational formats. Moreover, they require a continuous improvement of digital skills for both students and teachers. Overall, the online education experience is perceived as positive [95]. Changes induced by pandemics should be perceived as an opportunity to innovatively transform the educational system [21,96–99].

The current transforming environment is creating challenges regarding the way educational HEI strategies should evolve and adapt in a manner so that they will be able to support the future evolution of the labour market demand shifts and the changing expectations trends. Data show that it is expected that 42% of the core skills required from new employees to perform for existing jobs will change rapidly [100]. More than one-third of the worldwide jobs (estimated at more than 1 billion) are exposed to major transformations generated by technology and societal developments [101–103].

4.2. Negative Impacts of Online Education during Pandemics

Thus, the immediate switch from a face-to-face teaching and learning environment to an online one posed a series of challenges: low endowment of ICT equipment for both teachers and students, low digital skills particularly among teachers, unstable internet connectivity, increased need for support services (technical assistance for connectivity related problems, financial support for disadvantaged students, remedial courses for students lagging behind performance standards, socioemotional support, etc.), efforts to re-design courses, seminars and laboratories for the online platforms, the limits of instant switches to online in terms of content and delivery techniques adopted by teachers [104,105], losses for international students forced to give up their academic mobility ("Due to the travel restrictions and campus closure, many students changed or cancelled their plan of studying abroad [...] (HEIs) in the major destination countries, like the US, the UK and Australia, have anticipated a considerable decrease of international students in the coming semester" [106] increased pressure on the administrative staff for digitalization, the use of new media for the enrolment process, etc.

Some of these challenges were addressed by increased investments in ICT technology, training in digital skills, advise, counselling and psychological services for students and staff, reduced tuition fees and other financial schemes for vulnerable students, support

for webinars, online conferences and seminars, support for teacher and student access to vaccination, etc.

4.3. Teacher Perspectives of Online Education during Pandemics

Online education requires careful reconsiderations of the curriculum, support materials and online teaching software by the teacher. After the initial enthusiasm and clear commitment to ensure continuity in learning, teachers experienced occupational stress due to increased workload, insufficient digital skills, and digital pedagogy [107,108]. Teachers should be able to rely on continuous support from the university (tailored trainings and endowments of technology) [62,95,109]. Online education is also relevant for teaching Ph.D. students, with doctoral schools being more eager to adapt this form of education as research can be conducted from different places and/or research facilities [110].

4.4. Student Perspectives of Online Education during Pandemics

Sustainable and innovative online education depends greatly on the positive perspective of new forms of education and their level of acceptance level. Positive perspectives depend on student digital readiness and accessibility to educational platforms [109].

Negative perspectives are influenced by challenges faced by the students: access to technology, limited digital skills [36,41,49], limited or lack of regular communication with teachers and colleagues [79–81]. There is increasing interest in investigating mental-related problems [111,112]: high stress and anxiety, emotional distress, fear and isolation [41,81,84,85] and also regarding the way in which knowledge co-creation with different organisations and the development of communities of online practise can be achieved [62,113].

5. Conclusions

The latest COVID-19 pandemic has raised research interest in investigating the impact of the health crisis on educational systems and their ability to adapt to the needs of students and teachers. The crisis caused already existing problems in educational systems and caused new growing challenges. Of the 67 studies, most of them focused on positive student perceptions (62.6%) while there were 23.8%negative ones, and 13.6% were neutral. As exclusively online and blended learning will evolve along with teaching and learning digital skills, we might witness several dynamic changes in student perceptions.

Among the identified advantages of online education, there are efficiency-related factors contributing to the supportive attitudes of the learners (technology application, self-directed learning, and flexibility). The review highlights an opportunity for the field to understand the nature of the pandemic process and its impact on relevant stakeholders in education. Based on the currently published research, we identified the need for a complex perspective on the evolution and future trends of online education. If researchers do further analysis of the whole pandemic context, insightful perspectives of the changes induced by the crisis seen as lessons learned will shape the future educational systems. The gains from this complex experience should nurture future approaches and adaptive behaviours of the relevant stakeholders of educational systems.

The impact of the COVID-19 pandemic on online education should be further investigated, and the student perceptions of students of online education should be joined by teacher perspectives on the efficiency of online teaching and learning processes as well as by the decision-making processes related to new educational environments.

The digitalization of the educational sector is an ongoing process of integrating innovative technologies in the educational curriculum and requires a new pedagogical approach focused on learner autonomy, collaborative learning and the cognitive and social presence of students and teachers. The impact of these technologies on the re-design of teaching methods and tools, on students' commitment to learning, on students' learning experiences and on decision-makers' adaptive strategies by decision makers represent relevant areas for further research.

Research has also considered the COVID-19 abandonment of higher education programs by students as they had difficulties in coping and adapting to online education, social distancing and/or lack of teacher face-to-face support and interactions. For most universities, university administration processes have moved online, thus, reducing, to a great extent, the social interaction with different stakeholders, such as secretaries and administrative personnel. To a certain extent, this lack of social interactions triggers the self-isolation of individuals; thus, further research could also investigate the negative consequences of online education.

By integrating the most suitable and efficient digital tools, technologies and pedagogies that were validated during the pandemic into future educational environments, students can embrace the new adaptive behaviour of HEI. Future research endeavours should highlight the transformative processes and educational strategies adopted by universities to meet the challenges of such a dynamic system. The investigated studies did not cover the best practises that might be transferred in future educational formats.

Among the limitations of our study, we can pinpoint that we focused only on student perceptions of online education during the pandemic without comparing with the results existing in the pre-pandemic period. In addition, student perceptions should be complemented with teacher perceptions as well as decision maker perceptions. Future research could explore the sustainability of new educational formats and the relations dynamics of relevant stakeholders in education.

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