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Review

# Research on Higher Education during the COVID-19 in the Gulf Cooperation Council: An Overview of Publications in the Journal *Sustainability*

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**Abstract:** This study analyzes the research associated with higher education during the COVID-19 pandemic in the Gulf Cooperation Council (GCC) region, offering an overview of papers published in *Sustainability* by utilizing the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA). The analysis comprised a total of 17 papers, illuminating a number of common features, thematic foci, and prevailing issues as well as recommendations for rethinking higher education delivery in the future. Briefly, the analysis of common features revealed that most of the papers were published in 2021, researchers were mostly affiliated with higher education institutions in Saudi Arabia, data were mostly collected from undergraduate students, and papers were mostly quantitative. Regarding thematic focus, papers were generally related to teaching, learning, and assessment. As for prevailing issues, results highlighted a lack of practical studies in higher education research in the GCC region and a need for extending the conducted research to further context including other countries and populations. Finally, the key recommendations included improvement in the use of information technology and distance learning tools, as well as the design of policies and regulations to ensure more relevant academic intervention and guidelines for utilizing the tools and technologies.

**Keywords:** higher education; COVID-19; pandemic; systematic review; PRISMA; *Sustainability*



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## 1. Introduction

Higher education institutions (HEIs) have historically played a significant role in the social, economic and, cultural transformation of many societies. For centuries, they have been an especially important player in the progress and development of nations [1]. Over the years, HEIs have witnessed drastic changes and their crucial role, as agents of change, has of late come under close scrutiny, calling for a rethinking and reimagining of their function. In more recent years, however, the purpose of HEIs in general, and universities in particular, has been revisited, with specific emphasis on higher education for sustainable development [1]. Concerted efforts have, therefore, focused on the integration of sustainable development in HEIs [2]. More specifically, European HEIs have taken the lead in this direction, surpassing their counterparts internationally [3,4].

Universities are key catalysts in nurturing the skills and knowledge for their importance in the transition to sustainable societies. As such, they “have a unique role in deepening and expanding human knowledge (through learning and research)” [5] (p. 607). However, their role in effecting and spearheading change for sustainable development is still in its nascent stages [6]. As Koehn and Uitto [7] noted, the impact of HEIs in promoting sustainability lies in effecting “real-world changes in ecological sustainability, policies, and people’s well-being.” (p. 624). A similar view is echoed in work conducted by Findler and colleagues [8] who emphasized the leading role universities play in driving sustainable development.

The purpose of this article is to provide a comprehensive overview of scholarly papers published in higher education during the COVID-19 pandemic, identifying common features, thematic focus, and issues encountered, along with the possible recommendations made for rethinking higher education in the future.

The main research problems are as follows:

1. What are the common features and thematic foci that dominate higher education research during the COVID-19 pandemic in the GCC region?
2. What are the main gaps and issues characterizing higher education research during the COVID-19 pandemic in the region?
3. What are the proposed recommendations for rethinking and adapting higher education delivery in the future?

In presenting a detailed overview of research on higher education in the GCC, this study addresses an important area that is of key significance in a region that aspires to transform to sustainable education, a topic that remains largely under-studied.

Existing literature points to a host of factors that affect research production [9], including the researcher's individual characteristics, institutional factors, and previous output or accumulative advantage. Indeed, a positive association has been found between these factors and research output. The "accumulative advantage" or researchers' previous experience is identified as a determinant of research output. That is, productive researchers tend to be more productive in their future careers compared to those with low research output, meaning that researchers build on their previous publications [10–12]. For the purpose of our study, we examined research publications produced in the GCC from 2020 to 2022 through the lens of the accumulative advantage.

## 2. Methods

This study provides a comprehensive overview of all scholarly papers on higher education during the COVID-19 pandemic in the GCC region in the journal *Sustainability*. A systematic methodology was utilized for all the published papers in the identified journal. The selection of articles published in *Sustainability* was made on the occasion of a publication by *Sustainability* of a special issue *Impact of COVID-19 on Students and Teachers in Higher Education Institutions. Proposals and Policies for Improvement*. To fulfill this goal, it employed "explicit, pre-specified methods to identify, select, assess, and synthesize scientific evidence [and thus] increase the transparency, objectivity, and rigor in the review process" [13] (p. 619). By following this explicit and systematic process, the researchers sought to also ascertain consistency and ensure the credibility of systematic reviews [14–17].

Whereas traditional reviews focus on describing and explaining literature [18,19], systematic reviews focus on specific topics [19]. Indeed, systematic reviews allow for the synthesis and critical appraisal of existing research [20–23] while resorting to a priori protocol, a comprehensive literature review search, selected studies critical appraisal, and synthesis of findings [23]. A systematic review is replicable and transparent [24–26], synthesizing existing knowledge related to a specific field [26]. It also makes it possible to identify existing gaps in the literature [26]. It involves selecting literature with a crucial analysis in relation to a clear research question [27].

This review was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines [28]. This process provided a detailed and comprehensive frame for evaluating quality and the risk of bias associated with the studies selected for this research [29], thus yielding an evidence-based foundation for enhancing accuracy, objectivity and transparency of the review and meta-analysis [30]. More specifically, the PRISMA allows for a "systematic review, providing an evidence-based foundation for transparency in identifying, selecting, appraising, and synthesizing the studies being reviewed" [31] (p. 7).

### 2.1. Eligibility Criteria

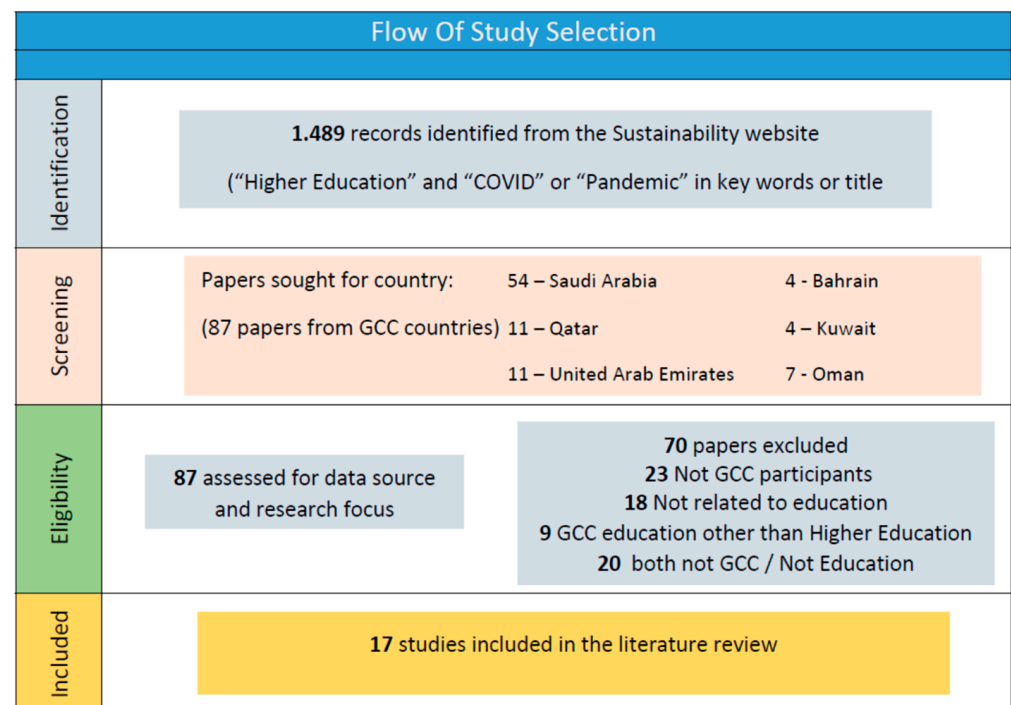
In assessing the quality of the literature, reviews have to “ensure that only the most appropriate, trustworthy and relevant studies are used to develop the conclusions” [32] (p. 154). In line with the rigorous process governing published work in academia [33], the eligible studies in this review encompass all article types published in Sustainability, searching the texts “higher education” and “COVID” or “pandemic” either in the title or keywords. The papers were filtered by the year (2020, 2021, and 2022) and countries (GCC countries namely Qatar, Kuwait, Oman, Bahrain, United Arab Emirates, and Saudi Arabia).

### 2.2. Information Sources

In 19 May 2022, the researchers visited the website of Sustainability and accessed all the papers in the archives, as it is an open-access journal. Particularly, Sustainability is a peer-reviewed journal, publishing international and cross-disciplinary papers related to a wide variety of subjects in natural sciences, social sciences, and humanities.

### 2.3. Study Selection

Figure 1 shows the flow of the study selection process, with the identification, screening, eligibility, and included studies. Briefly, using the journal’s website, the advanced search results revealed that, a total of 1489 papers were published in this journal, searching the texts “higher education” and “COVID” or “pandemic” either in the title or keywords. Among these studies, 87 papers were having a GCC country affiliation. After a detailed analysis, 17 papers were included in the data analysis. In particular, 70 papers were excluded from the analysis because either data were collected from non-GCC participants or they were not related to education. The retained papers [34–50] are marked with an asterisk in the references list and are also listed in the Appendix A.



**Figure 1.** Flow of the Study Selection.

### 2.4. Data Extraction Process

Data were extracted about publication year, country, participants/data source, article type and research method, thematic focus, issues, and resolutions. Prior to analyzing the data, the researchers established a coding protocol for publication year, country, partici-

pants/data source, article type, and research method, and thematic focus to review the data systematically. For the issues and resolutions, the researchers did not establish prior coding as the data evolved while examining the information in the selected papers. The variables and the codes are listed in Table 1.

**Table 1.** Data items and codes.

Year	Country	Participants/Data	Article Type	Research Method	Thematic Focus
1. 2020	1. Saudi Arabia	1. Undergraduate students	1. Article	1. Qualitative	1. Teaching, Learning, Assessment
2. 2021	2. Qatar	2. Graduate students	2. Reviews	2. Quantitative	2. Student Transition and Graduate Attributes
3. 2022	3. United Arab Emirates	3. Faculty members	3. Perspectives	3. Mixed	3. Professional Development
	4. Oman	4. Reports	4. Editorial	4. Conceptual	4. Policy, Management, and Governance
	5. Bahrain	5. Others	5. Communication	5. Others	5. Diversity in Higher Education Institutions
	6. Kuwait		6. Others		6. Others

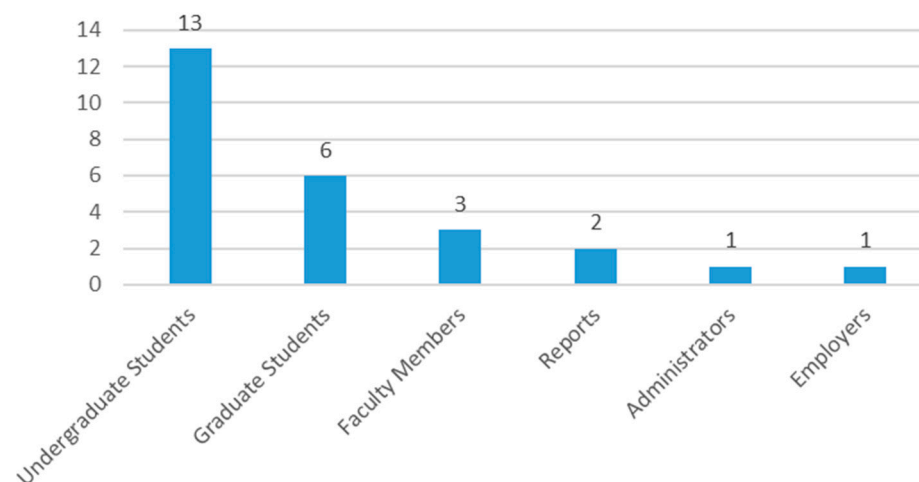
### 3. Results

#### 3.1. What Are the Common Features and Thematic Themes That Dominate Higher Education Research during the COVID-19 Pandemic in the GCC Region?

The analysis of common features and thematic focus consisted of examining a number of demographic and methodological characteristics, including publication year, country, participants/data source, article type, research method, and focus of the study. As for publication year, the results showed that 3 papers were published in 2020 (17.7%), 8 papers in 2021 (47%), and 6 papers in 2022 (35.3%), the highest number of publications year being 2021.

As for country, with regard to the affiliations of the researchers, most were affiliated to centers or higher education institutions in Saudi Arabia ( $n = 15$ , 88.2%), followed by Qatar ( $n = 1$ , 5.9%) and the United Arab Emirates ( $n = 1$ , 5.9%). This implies that, in selected research, papers from Oman, Kuwait, and Bahrain did not emerge.

Regarding participants/data source (Figure 2), the majority of the data were collected from undergraduate students ( $n = 13$ , 76.5%), followed by graduate students ( $n = 6$ , 35.3%), faculty members ( $n = 3$ , 17.7%), published papers/reports ( $n = 2$ , 11.8%), as well as administrators ( $n = 1$ , 5.9%) and employers ( $n = 1$ , 5.9%).



**Figure 2.** Participants/Source of Data.

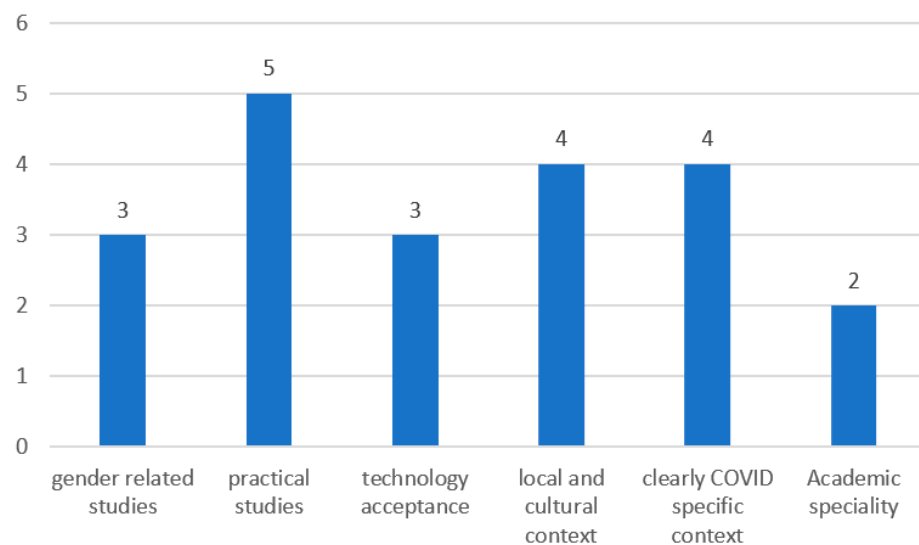
Regarding the type of paper, all the papers were articles ( $n = 17, 100\%$ ). There were no papers in the form of reviews, perspectives, editorial, or communication, which are among the top five types of articles published in this journal, in addition to articles.

Regarding research method, the majority of the papers were quantitative ( $n = 15, 88.2\%$ ), followed by qualitative ( $n = 1, 5.9\%$ ) and mixed ( $n = 1, 5.9\%$ ). Among the quantitative papers, six studies took the design of structural equation modelling (40%), six studies used a survey design (40%), two studies adopted a correlational design (13.3%), and one study used a causal comparative design (6.7%). The qualitative paper was a case study. There was no paper having a conceptual research method (e.g., literature review, systematic review, opinion, field notes) or other methods.

Lastly, as for the thematic focus of higher education research published during the COVID-19 pandemic in the GCC region, the majority of the papers were related to teaching, learning, and assessment in higher education during the pandemic. In addition, there was a paper about graduate attributes ( $n = 1, 5.9\%$ ) and policy, management, and governance ( $n = 1, 5.9\%$ ).

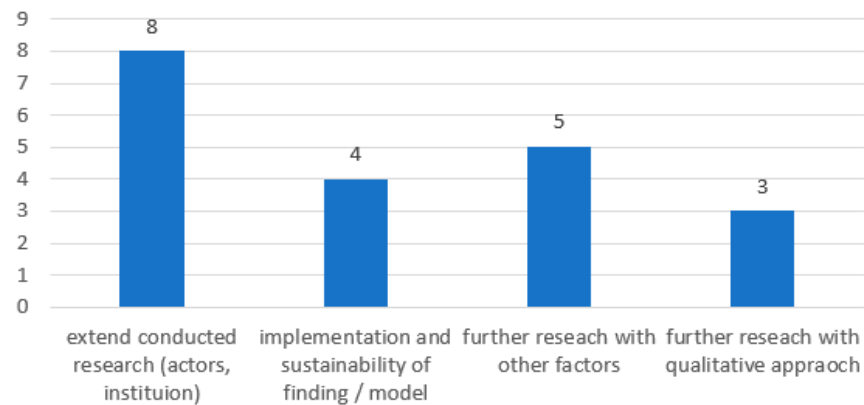
### 3.2. What Are the Main Gaps and Issues Characterizing Higher Education Research during the COVID-19 Pandemic in the Region?

The main gaps in higher education research during COVID-19 in the GCC are distributed between gaps leading to the existing research addressed in the selected paper and gaps emerging from it (Figure 3).



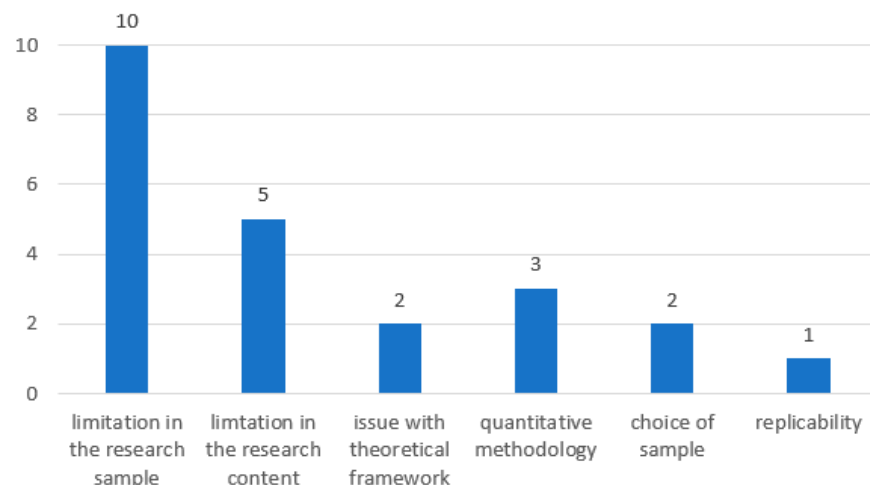
**Figure 3.** Previous Gaps Identified in the Research (some of the studies meet several criteria, for example, gender-related studies and local cultural context (2 studies), practical studies, and academic specialties (both studies)).

Practical studies focused on the identified lack of research in the relation to the design of a virtual course (articles 2, 4, 7, and 10) in replacement of a physical one. Four of the research identified the lack of research on the specificities of the GCC region, such as negative perception of GCC students (10), or local context not taken into consideration into current researches (6,9). Besides local context, focus on the gender issue, as related to gender-segregated society, figures in three pieces of research. Most of the research focuses on the lack of transition to online learning, but only four identify the lack of research on COVID context as the specific gap in research. technology acceptance model (TAM) and Learning Management System (LMS) model implementation in Higher Education has identified gaps in three papers. Finally, two papers explore the implementation of models in a specific specialty, medical sciences or technology (Figure 4).



**Figure 4.** Present Gaps (some of the studies meet several criteria, for example, integration of additional factors and qualitative factors or extension of the research to other institutions).

The articles identify present gaps emerging from present research. The majority of the gaps relate to either extension of the present research to other institutions or countries, eight studies, or to the addition of other factors, such as social or cultural dynamics, for five studies. Four studies identify further research in the implementation of the identified model as potential research. Finally, as several studies are quantitative, there is an identified need for the inclusion of a qualitative approach to complement the current research (Figure 5).



**Figure 5.** Researches Limitations and Issues (some of the studies meet several criteria, for example, research sample and content, for 2 studies, research sample and quantitative methodologies for 2 other studies).

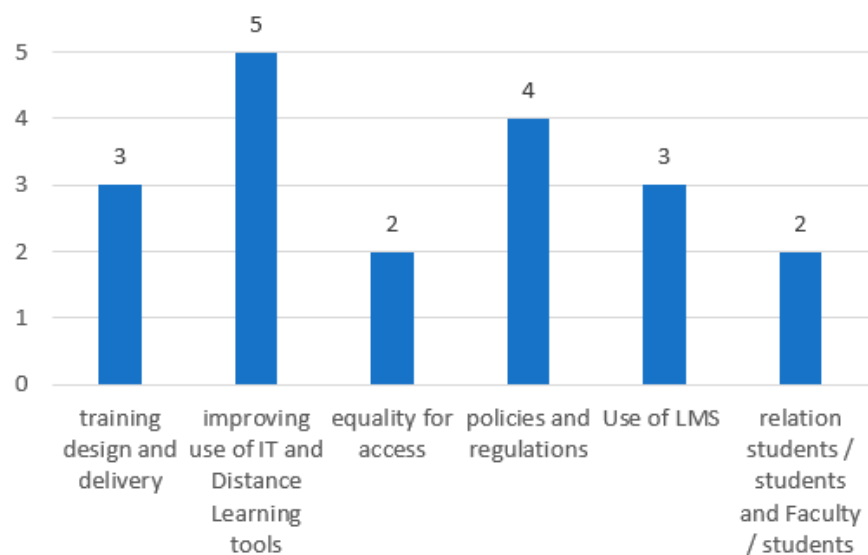
Research in the GCC suffers from one main challenge and limitation, which relates to sampling. Most of the selected research during the pandemic focus on a specific university or department within the university. They revolve around a population sample limited to the university itself and, even within the university, to a limited population. The choice of the sample may be constrained to limited institutional or contextual factors. The other main issue in research is the limitation in factors integrated into the chosen model that may overlook socio-cultural aspects. Two studies identify the full relevance of the chosen model or theoretical framework as an issue. Finally, the replicability of the model to other contexts or research can be seen as disputable.

Additionally, we can highlight the diverse fields of higher education analyzed in the selected papers. There is a high diversity of fields represented in the selected papers from engineering (electrical and mechanical), with one paper for each, accounting (one paper), health science (one paper), educational technologies (one paper), IT (one paper), and STEM

(two papers). This diversity is further reinforced by the bulk of research focusing on general education (three papers) or cross-sectional within the university (six papers).

### 3.3. What Are the Recommendations Proposed for Rethinking and Adapting Higher Education Delivery in the Future?

The COVID-19 period and its transition to distance learning had an unprecedented impact on education delivery in HE and research associated to this transition and situation has identified areas proposition for improvement (Figure 6).



**Figure 6.** Recommendation to Improve and Adapt IH (some of the studies meet several criteria, policies and regulations, and use of LMS).

Researchers while exploring HE service organization and delivery drew conclusions identifying the potential area of improvement. As the main area of investigation was eLearning and the use of new technologies, the main recommendation relates to an improvement in the use of IT and distance learning tools. One of the first recommendations is for universities in managing the use of IT to take into consideration factors influencing its utilization by faculty and students (perceived ease of use, perceived effectiveness, and accessibility among others). Besides the integration of these factors with reference to LMS models, training, through the design of IT-related or more qualitative and relevant topic-related training, could benefit from the experience of distance learning and associated research. In these, integration of virtual alongside physical training could be beneficial and virtual training could contribute to improved practical modules. Model-based management of social media could also be used to increase the university's impact and improve access to courses and HE related information. Another key recommendation and a potential contributor to HE improvement is the design of policies and regulations ensuring more relevant academic intervention and providing guidelines for the use of IT.

Research also advocates for the promotion of equality in access to HI courses in relation to gender and special needs. Indeed, as distance learning appears more favorable for women, universities should attempt to guarantee the same in physical learning.

Finally, these researches expose the importance of student to student and faculty member to student relationships. Hence, there is a need for the university to ensure that students have space to communicate and exchange between them and with faculty members as well. Along with these different recommendations, this research also underlines the necessity to implement monitoring and evaluation while delivering HE services so HE institutions can guarantee qualitative and equal access to services.



#### 4. Discussion

The present research draws attention to interesting aspects of academic research on higher education during the COVID-19 pandemic in the GCC, aspects that can also highlight some specificities of the research landscape in the region. Among the 17 studies kept for this study, 15 ( $n = 88.24\%$ ) were conducted in a HE institution of Saudi Arabia. This predominance within the academic institution in Saudi Arabia supports the findings from Mukerji and Jammel [51] highlighting that Saudi has the highest number of public HE institutions, followed by the UAE. In terms of total number of HE institutions, while including private colleges and universities, UAE overtakes SA [52]. However, when looking at the number of researches in this review, the results are consistent with the data from PwC [52,53] publications where Saudi Arabia, Qatar, and the UAE produce the vast majority of publications in the GCC. Thematics of research conducted during COVID-19 primarily relate to teaching, learning, and assessment (15,  $n = 88.24\%$ ). Then, policy, management and governance (1,  $n = 5\%$ ), and students transition rank at equal value. This repartition joins the MacFarlane [50] framework of research in higher education, between the two main domains of teaching and learning, to which students' transition can be associated, and then policy research. In the GCC during COVID-19, teaching and learning research was the primary research agenda, followed by policy. Liu et al. [54] ranked teaching and learning, student experience, and policy respectively at the 15th, 16th, and 12th positions in their review of existing research trends on Higher Education. The specific context of COVID-19 transition to online learning may explain this concern for teaching and learning rather than assessment, feedback, or diversity ranked by Liu et al. among the five most recurrent research topics in higher education [54,55].

Another interesting point identified in this review is both the predominance of quantitative research in adopted methodologies and the assumed intention to address the gaps in the application of models or hypotheses to a specific context, being gender-related, local GCC culture, or COVID context (Figure 3, the total number of studies for this is ten,  $n = 59\%$ ). While we can understand the intention in testing and validating practices and theories through the use of quantitative methods as the best ways to confirm theories, in reality [56], qualitative approaches are generally more adapted for better understanding and appreciation of practices in a more specific and local context [57]. This is supported by the fact that a high proportion of the 17 studies identified the need to integrate qualitative methods ( $n = 17.5\%$ ) as a research gap as well as the integration of additional factors or context ( $n = 47\%$ ). At the same time use of solely quantitative methodology was identified as a limitation for the research in several articles ( $n = 17.5\%$ ) as not allowing to provide a full reflection and analysis of the studied phenomenon.

Trends in the development of Higher Education institutions in Europe tend to focus on the acceptance of information and knowledge as a basis for social interaction [58]. This focus on information sharing is a key component within the identified research and can be explained by the contextual influence of the COVID-19 period. However, the social aspect of information sharing and interaction between students as well as between students and faculty stands as an important finding and recommendation for further research as well as policy development in the research. Further, another key trend in the development of higher education lies in the opening of higher education to its environment, both through dialogue and collaboration locally and internationally [59,60].

In light of these trends, an avenue for future research could be exploring if Higher Education research in the GCC undergoes a similar evolution to other regions of the world. We can look at Higher Education research in Asia, which has seen similar trends in its evolution to the present one in the Middle East in its development earlier from the 1990s [61]. As seen in this paper, the majority of the identified studies focus on teaching and learning, similar to the evolution in Asia, where there has also been a growing focus on pedagogy, teaching and learning [61]. However, research on policies in Asia was more prominent in the 1990s, before a shift in focus towards teaching and learning [62]. Meanwhile, current research in the GCC remains focused on policies and continues to recommend further

research on policies. It could be interesting to explore if higher education research in the GCC during its early evolution has comparative characteristics to research in Asia in the 1990s, such as limitation by the absence of theory [61], as underlined in one of the studies within this review.

#### 4.1. Limitations Found in the Analyzed Literature

One of the main limitations identified in the present research relates to the definition and identification of the samples. Given our study's theoretical framework, it appears that the accumulative advantage is missing in the selected publications. Sampling is key in the reliability and repeatability of a research [63] and as such raise question on the reliability and repeatability of research in the GCC. For quantitative research to be reliable in representing reality, the sample needs to be representative of an overall group for which the study results should be valid. Henceforth, sampling size and selection should be sufficient for this purpose [63–66]. Several studies from this review highlight the difficulty to access a high number of students in comparison to the total university population. At the same time, 13 studies explore only undergraduate experience ( $n = 76.5\%$ ). Even if undergraduates represent the majority of the student population in the region, i.e., 79.5% for Saudi Arabia [52], this focus may lead to neglecting the rest of HE population. Many pieces of research underline the need to extend the research to other members of the HE actors, mainly faculty.

The other identified limitation in sampling identification is the fact that participants have been identified because they are part of a course or a specific department or because they were the most accessible population. This can be seen as a convenience sampling approach, where the participants are selected because of their accessibility. However, in the approach, several researches resort to purposive sampling, the selection of samples based on what needs to be known and their assumed knowledge of this issue [66]. This sampling approach is usually more present in qualitative research. However, due to contextual constraints, such as limited access to students, faculty, or university, and low response to survey, the sample size and qualities are pre-identified to ease its access.

It also raises the question of knowing if the research topic is identified as a result of the available population or if the population is identified to serve the purpose of the research. Besides the limitation in the sample, research during COVID-19 is also limited by theoretical framework and limitation to a set number of factors. The reason for this limitation is not clearly defined, however it is identified as an issue and an alley for further research. Research, during COVID-19, can be said to be a constraint in the access to research subject and data, relevance of the theoretical framework as well as replicability. These factors are recurrent and it needs to be explored whether they are structural, inherent to GCC HE institutions, or contextual, resulting from the particular experience during COVID-19 pandemic.

#### 4.2. Conclusions

As was pointed out above, available research reveals that individual factors, institutional characteristics, and accumulative advantage are essential components that determine research output in HE. An important implication of this for our current study is the need for existing research to draw upon common features, thematic foci, and relevant issues derived from previous studies. This will help in consolidating efforts to establish a common and shared knowledge of the role of higher education in times of crises in the GCC and elsewhere.

Finally, in terms of recommendations for the future and evolution of HE in the post-COVID period, the main aspect relates to the use of IT in teaching and learning as well as in communication, management, and interpersonal relation in university. Improvement in the effectiveness and capacity to use IT is recommended but in complement to physical learning and interaction. This supports the finding of Eringfeld [67] that students and faculty hope for better use of IT as a complement to physical experience in the university.

The second aspect that can result from COVID-19 period is both an improvement in practices through training of both staff and students, and an improvement in the policy and regulation framework to allow better practices and the ability to act from HE institutions. It also suggests that COVID-19 period was an opportunity to demonstrate the importance of student to students and students to faculty interaction and relation, and the key perceived contribution of physical interaction. This is supported by previous research such as Tinto [68] or Kuh and Hu [69] who highlight the importance of both these interactions on students' motivation and attainment.

For this research, the proposition for improving and exploring factors contributing to developing these relations would benefit from the use of IT and virtual COVID-19 experience. Another recommendation lies in the design of courses and policies taking into consideration the use of IT and abilities to do so as well as the elaboration of policies encouraging and validating changes initiated during COVID-19 and responses to challenges, such as gender specificities, that became more salient during this period. Course design and implementation of relevant policies can increase student outcomes in teaching and learning or other skill development, such as social ability [70].

The present research has one main limitation as a result of the research selection of articles restricted to the *Sustainability* journal. It does provide an insight into academic research trends in the GCC but would benefit from expanding its systematic methodology to a wider corpus by expanding searches on research databases, such as SCOPUS and Web of Science, as well as on other publishers' websites such as Springer.

This research provided an insight into academic research in Higher Education during the COVID-19 period and offers an opportunity to name potential for further research. It identified several characteristics in this regard, such as the predominance of Saudi Arabia in research and publication. It could be interesting to explore if this predominance is valid across subjects, and identify factors, apart from the number of institutions, that favor this lead. The higher number of quantitative over qualitative studies was also flagrant. Further research in identifying the respective proportional value of quantitative and qualitative research as well as their impact factor through the number of citations would allow for the identification of potential regional specificities. Further, exploring the convergence of methodological choices with an extended set of objectives for the research through the analysis of sampling quantitative research would allow for a greater scope. The expressed need for qualitative research may indicate the need to grasp the process rather than the outcomes, the meaning attributed locally by local actors to outside theories and concepts, as well as the need for an inductive construction of concepts and abstractions [66,71].

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## Appendix A

**Table A1.** Details of publications selected for the comprehensive overview.

#	Authors	Year	Ref.	Country	Participants/Data source	ArticleType	Research Method	Thematic Focus	Issues/Gaps	Recommendations
1	Alturki & Aldraiweesh	2021	[34]	Saudi Arabia	Undergraduate students Graduate students	Article	Quantitative	Teaching, Learning and Assessment	Sample limitation/optimizing LMS to enhance sustainability in education	Remodel use of LMS by lecturers
2	Khandakar et al.	2022	[35]	Qatar	Undergraduate students	Article	Quantitative	Teaching, Learning and Assessment	Theoretical framework and associated activities/use of MPL to improve students' competences	Improving MPL courses implementation/using online courses for senior students
3	Alyahya et al.	2022	[36]	Saudi Arabia	Undergraduate students	Article	Quantitative	Teaching, Learning, and Assessment	Limited factors, quantitative. longitudinal research elearning outcomes	Avoid generalization, positive learning experience for all
4	Mohammed	2021	[37]	Saudi Arabia	Undergraduate students	Article	Qualitative	Teaching, Learning and Assessment	Gender issue (specific cultural dimension)	Plan hybrid learning, mixed physical/virtual
5	Omar, Ali & Belbase	2021	[38]	United Arab Emirates	Graduate students	Article	Quantitative	Teaching, Learning and Assessment	Sample randomisation, questionnaire limitation, factors, qualitative studies	Create virtual space for students to students interaction by faculty
6	Alshaikh et al.	2021	[39]	Saudi Arabia	Undergraduate students Graduate students	Article	Quantitative	Teaching, Learning and Assessment	Limited sample to one public university, no qualitative/teacher perceptions, include other institutions—countries	Facilitate communication with/between students, class teaching use of MOOC tools, inspire students use MOOC
7	Alamri	2022	[40]	Saudi Arabia	Undergraduate students Graduate students Article students	Article	Quantitative	Teaching, Learning and Assessment	Limitation in sample and factors. Use of LMS management in various context.	Optimize investment in LMS for Higher Education,
8	Pilotti, El-Moussa & Abdelsalam	2022	[41]	Saudi Arabia	Undergraduate students	Article	Quantitative	Teaching, Learning, and Assessment	Content limitation educators are concerns for students learning	Analyze factors influencing participation/success in online learning in relation to genders

Table A1. Cont.

#	Authors	Year	Ref.	Country	Participants/Data source	ArticleType	Research Method	Thematic Focus	Issues/Gaps	Recommendations
9	Alturki & Aldraiweesh	2022	[42]	Saudi Arabia	Undergraduate students Graduate students	Article	Quantitative	Teaching, Learning and Assessment	Limitation in sample and factors Faculty, instructors/other stakeholders perspective	Encourage universities to use PU, PEU and PI to encourage use of online learning
10	Pilotti & Al Ghazo	2020	[43]	Saudi Arabia	Undergraduate students	Article	Quantitative	Teaching, Learning and Assessment	Sample limited to women compulsory participation	Sustain learning of scientific reasoning
11	AbdelSalam, Pilotti & El-Moussa	2021	[44]	Saudi Arabia	Undergraduate students	Article	Quantitative	Teaching, Learning and Assessment	Limited sample, convenience choice. women education measurement	Quality modules to ensure quality education in online courses
12	Meccawy, Meccawy & Alsobhi	2021	[45]	Saudi Arabia	Undergraduate students Faculty members Reports	Article	Quantitative	Teaching, Learning, and Assessment	limitation in sample and factors need to search on perception	Address technical and nontechnical aspect to improve satisfaction. Provide training and use tools, respond to special needs.
13	Alblihed et al.	2022	[46]	Saudi Arabia	Undergraduate students	Article	Quantitative	Teaching, Learning and Assessment	Limited sample and factors perception of online learning and in medical science	Regular evaluation/monitoring, policy for academic interventions
14	AI-Youbi et al.	2020	[47]	Saudi Arabia	Reports Others	Article	Mixed	Policy, Management and Governance	No international benchmark. Social media performance factors	Social media management framework, decision-making tool.
15	Mujalli, Khan & Almgrashi	2022	[48]	Saudi Arabia	Undergraduate students Graduate students Faculty Members	Article	Quantitative	Teaching, Learning and Assessment	Limitation of sample, restriction to quantitative method. quantitative & qualitative data, research to other institutions with	Better usage of Blackboard functionalities, improvement integrating socially, user-friendly aspects

Table A1. Cont.

#	Authors	Year	Ref.	Country	Participants/Data source	ArticleType	Research Method	Thematic Focus	Issues/Gaps	Recommendations
16	Almulla	2022	[49]	Saudi Arabia	Faculty Members	Article	Quantitative	Teaching, Learning, and Assessment	Sample size limitation, more institutions, qualitative data. student and faculty perspectives	Identify factors influencing student/faculty use of technologies
17	Al-Youbi et al.	2020	[50]	Saudi Arabia	Other	Article	Quantitative	Student transition and graduate attributes	Quantitative study. Gap: context-specific research	Flexibility of institutions, development of virtual skills.

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