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Review

Systematic Review and Annotated Bibliography on Teaching in Higher Education Academies (HEAs) via Group Learning to Adapt with COVID-19

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Abstract: Student learning has been affected by the recent shift in education globally which has been attributed to adaptation to the recent COVID-19 pandemic. This study will look at these characteristics to better understand gender differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance on a worldwide scale. Due to the rapid COVID-19 pandemic, many educational institutions had to close, forcing many students to stay at home and enrol in online courses. Due to the practical laboratory sessions and workshops demanded by Science, Technology, Engineering, and Mathematics (STEM) modules and other related fields, education has faced difficulties during the COVID-19 pandemic. Understanding student involvement and its role in promoting a number of desirable outcomes, including academic outcomes like greater achievement, lower dropout rates, as well as various well-being and life outcomes, has therefore become increasingly important. This paper presents the scientometric review with an annotated bibliography on teaching styles through group learning in the higher education academies (HEAs) directed towards sustainable education. The current work also gives an annotated bibliography that seeks to compile and integrate the research on student participation, group learning, instructional strategies, equality, and diversity. Some evaluations and suggestions are also made in the study.

Keywords: teaching; higher education academy (HEA); learning; COVID-19; education; diversity; group learning; sustainability; systematic review; annotated bibliography; student engagement

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1. Introduction

Education has been identified as one of the key elements of the United Nations Sustainable Development Goals, which should be promoted amidst various challenges. However, all facets of peoples' life have been impacted by the COVID-19 pandemic on a global scale. Different people have different levels of resilience and abilities to cope and adapt to difficulties as well as events that are traumatic and that may have happened during this recent pandemic. Due to the pandemic, the year 2020/2021 marked a turning point in the history of digital technology in education, enabling a sustainable education even while the world dealt with an unprecedented pandemic disaster [1–3]. As a result, the transition from traditional classroom instruction to online instruction will take place, forcing students to adopt digital learning [4–6]. Aside from e-learning, which has increased in popularity since the occurrence of COVID-19, there are other areas of teaching and learning that have been adapted to the transition [7–10]. This study will look at these characteristics to better understand student engagements, diversity, and cultural differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance on a worldwide scale. Due to the unexpected COVID-19 outbreak, many educational institutions were compelled to close,

forcing many students to stay at home and attend online courses [11–14]. STEM (Science, Technology, Engineering, and Mathematics) curricula had difficulties due to the recent COVID-19 pandemic because they require practical laboratory sessions and workshops; hence, the educators have to be trained [15–20]. Although there are other methodologies that have been very effective, group learning has always been among the best methods [20], and social distancing rules involving staying 2 m apart, closures of schools during the lockdowns in most countries, and restrictions on group gatherings were some limitations to group learning during the recent COVID-19 pandemic.

From a bibliographic perspective, the shortage of annotated bibliographies on teaching methods in higher education academies (HEAs) is one of the biggest problems that libraries and educational institutions have to deal with. Annotated bibliographies can be used to pinpoint knowledge gaps, such as how to comprehend student interactions by contrasting studies on low and high levels of student participation. There is a gap for general teaching in HEAs in various areas, as seen from the annotated bibliographies studied. Some of these annotated bibliographies cover various levels of course-based education in English [21–27]. Other annotated bibliographies cover various ranges of topics including those on teaching [28], virtual exchange [29], STEM teacher education [30,31], gender bias [32], digital library [33], plagiarism in engineering [34], online learning [35], technical education career [36], curriculum design [37], engaged learning [38], group works [39], business models [40,41], the economics of education [42], scheduling [43], forecasting [44], algorithms [45], distance learning [46,47], sociology [48,49], search optimisation [50], geological lineation [51], the health response to COVID-19 [52], and teaching methods [53].

The teaching standards in HEAs must be maintained, as teaching supports the United Nations' goal on sustainable education. Resilience, adaptability, and flexibility have always been necessary for teachers, but COVID-19 took those requirements to totally new levels [54–57]. Although challenging, the recent COVID-19 pandemic has provided us with an opportunity to reset and reassess. Schools, educators, and organisations that prepare future educators have had the opportunity to reflect on their past practices and plan how they will enhance and modify their teaching and learning in the future. The pandemic has given us new perspectives, and institutions as well as their teacher-educators have learnt lessons throughout COVID-19 [58–62]. Despite the significant challenges faced during the epidemic, certain positives will last for some time. Our entire educational system and organisational structure had to change to entirely remote communication and online learning as a result of COVID-19 [63–66]. An earlier part of this annotated bibliography has been conducted on online learning as a teaching style [67]. However, there is the need to consider group learning in HEAs. Finally, these annotated bibliographies explore the instructor's role in promoting a dialogue on diversity, instructional reflections, student interactions, and ways for doing so successfully. As a result, one will develop as a teacher and learn how to impart knowledge in a way that will aid students in comprehending a module. The primary concerns of an excellent teacher are for their achievement and interest. They will make sure to cooperate in an atmosphere of love and fairness while upholding the principles of equality and diversity. Their academic success is given first attention, and the instructor ensures that students engage fairly while upholding teaching morals such as equality and diversity. The instructor might also ask some of them to try out some of the problems that are put on the board in order to increase their confidence in their capacity to answer challenges. These teaching and learning experiences are covered in some systematic reviews conducted by earlier researchers [68–83].

This paper presents the scientific review with annotated bibliography on teaching in HEA for group learning. Section 1 introduces the work with themes of group learning, student engagement, diversity, and teaching with their frontiers towards sustainable education. Section 2 presents the methodology of the current work, which aims to consolidate and synthesise the literature on teaching in HEAs. Section 3 introduces group learning, while Section 4 covers lessons learnt from the COVID-19 pandemic. Section 5 presents the

systematic and scientometric reviews of the subject area. Section 6 presents the annotated bibliography, while the conclusions drawn from this study are given in Section 7.

2. Materials and Methods

This section covers the materials and methods adopted for this annotated bibliography on the teaching style in higher education academies (HEAs). To obtain this data, search was obtained from existing repositories from various institutions on annotated bibliography and from the SCOPUS database. Using the SCOPUS database, 88 documents were obtained and included in this annotated bibliography in this subject area. The search syntax used in SCOPUS was "teaching AND higher AND education AND academy AND online AND learning OR COVID-19", as shown in Figure 1, which shows the methodology for obtaining the data used. The search results from the SCOPUS database are in Figure 2. It is noteworthy to state that SCOPUS was used among other databases because of the ease of sorting the relevance, classifying the search, extracting the required results, and profiling the literature.

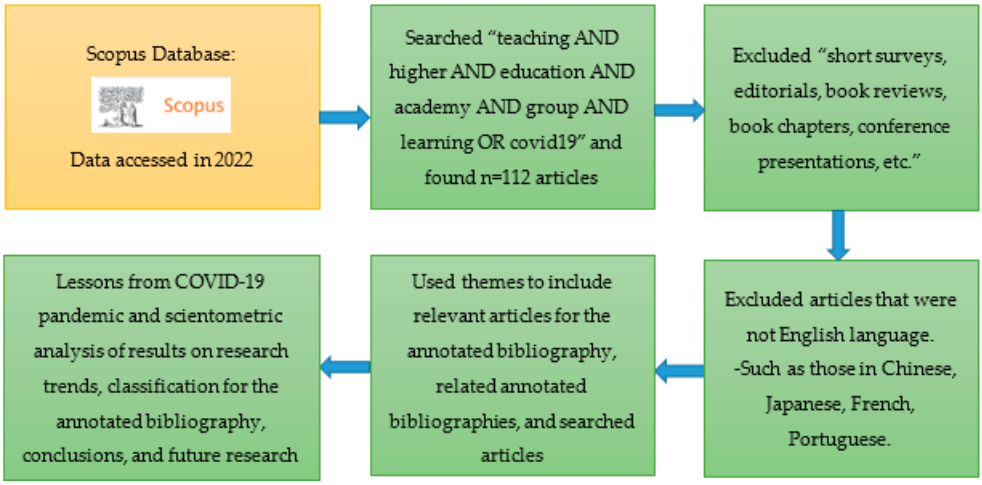

Figure 1. Methodology for the annotated bibliography on the search phrase "teaching AND higher AND education AND academy AND group AND learning OR COVID-19".

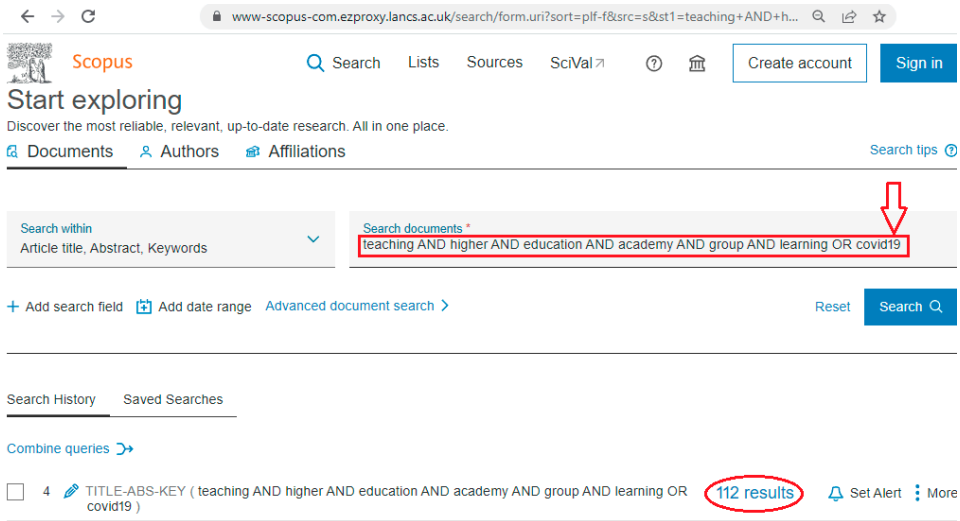

Figure 2. SCOPUS database supplied by Lancaster University UK showing the used search phrase on "teaching AND higher AND education AND academy AND online AND learning OR COVID-19" with 112 publications and other search phrases for the research area.

3. Systematic Review and Scientometric Analysis on the Annotated Bibliography

In this section, a systematic review and scientometric analysis of our annotated bibliography on teaching in higher education academy was conducted based on the research themes. In this study, the research trends were investigated from the publication history, the publication classification, the subject area, the publication by country, journal range, the publication by affiliations, and the author keywords. To understand the research patterns in teaching in HEAs, data were retrieved from SCOPUS to be presented in the findings in Figures 3–10.

Figure 3. Result of publication records for research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

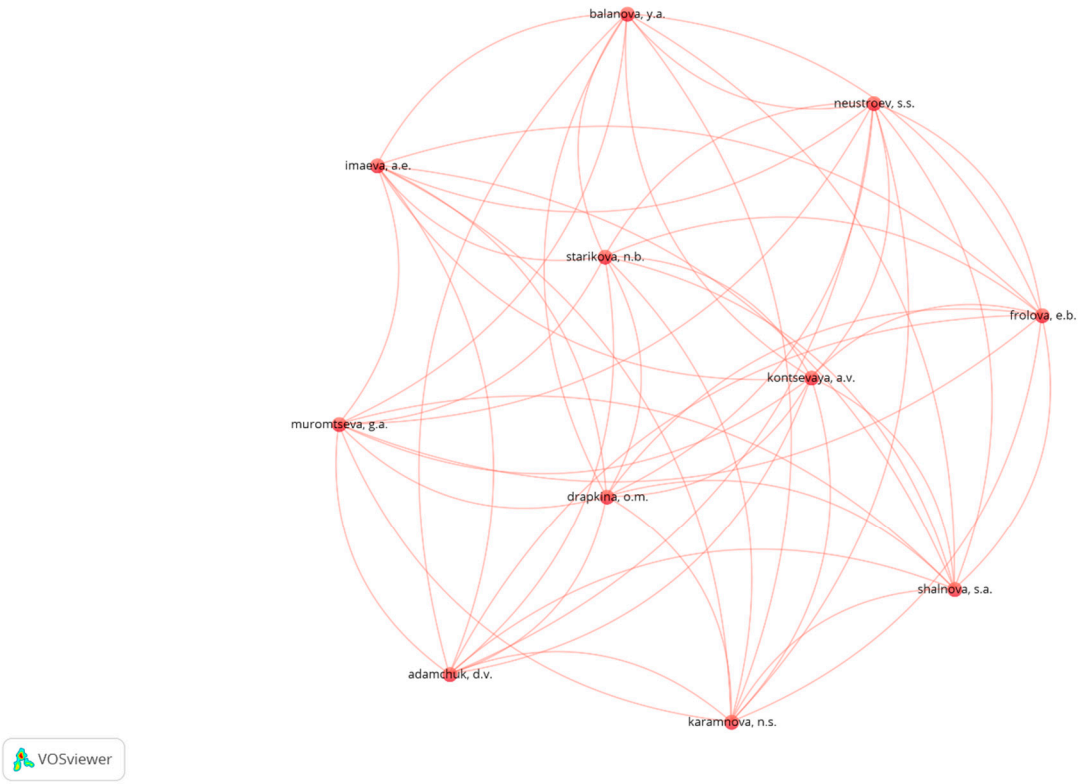

Figure 4. Visualisation mapping showing network of citations from publications on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database, and visualised on VOS Viewer).

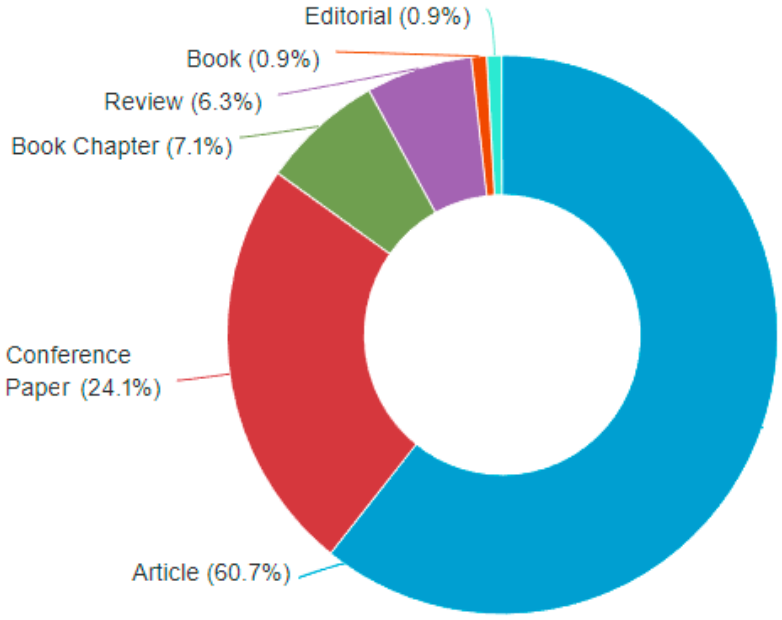

Figure 5. Result of publications by subject area for the research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

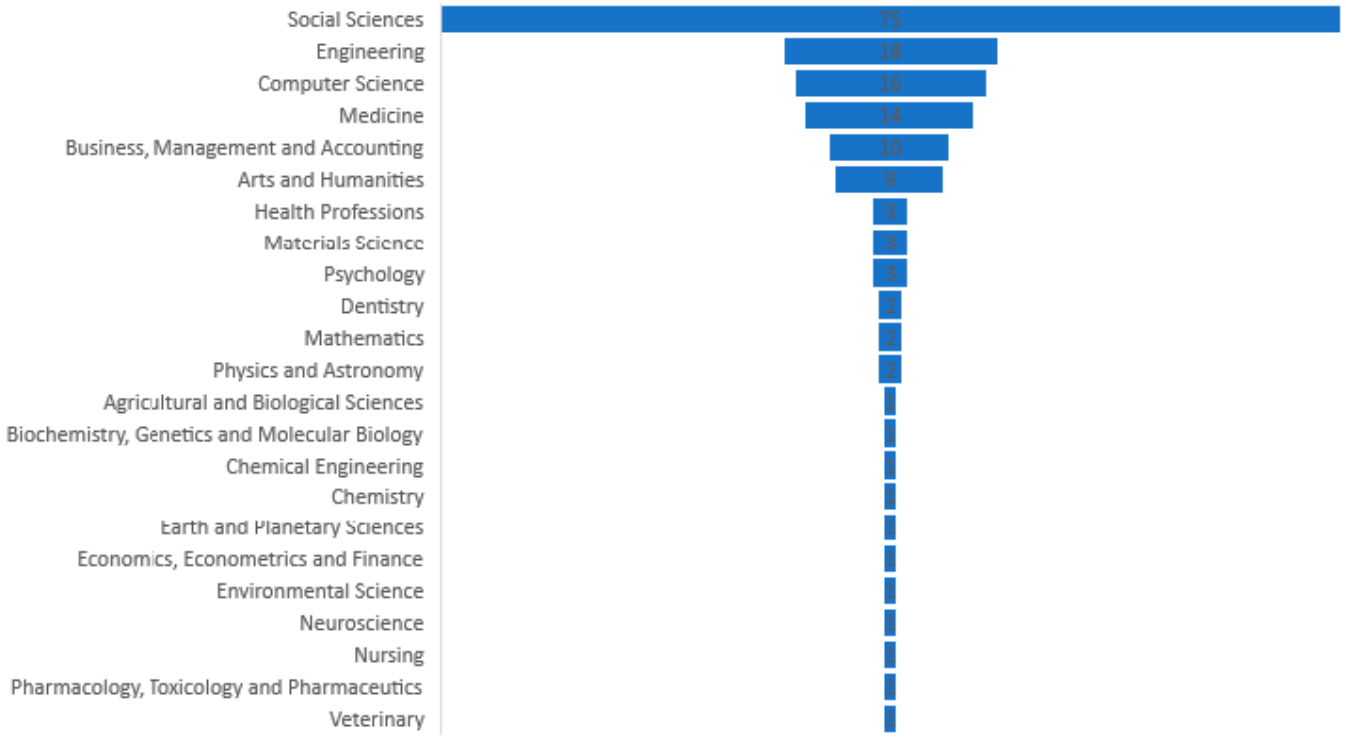

Figure 6. Result of publications by classification (or type) for the research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

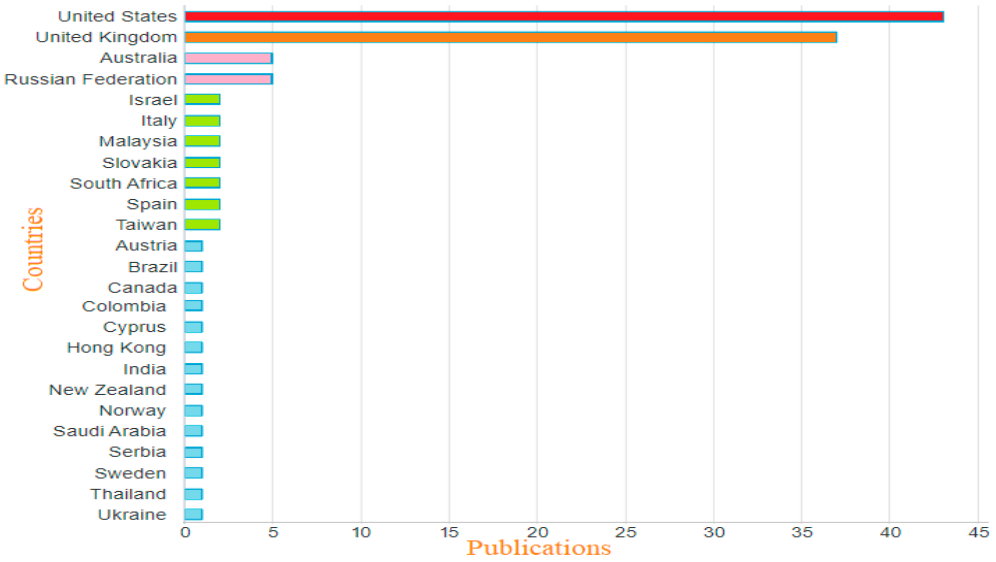

Figure 7. Result of publications by countries for the research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

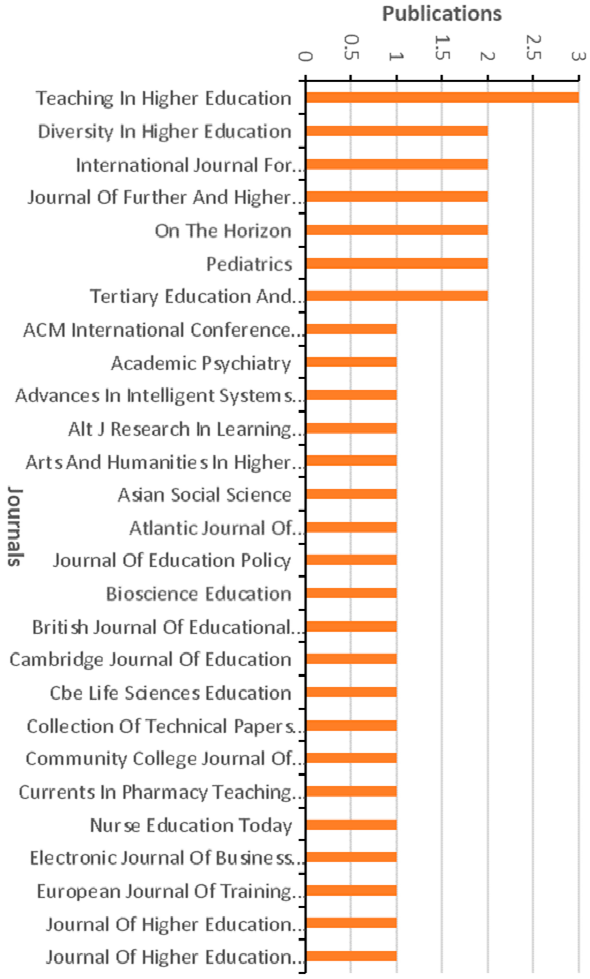

Figure 8. Result on the range of journal publications for the research showing the top journals on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

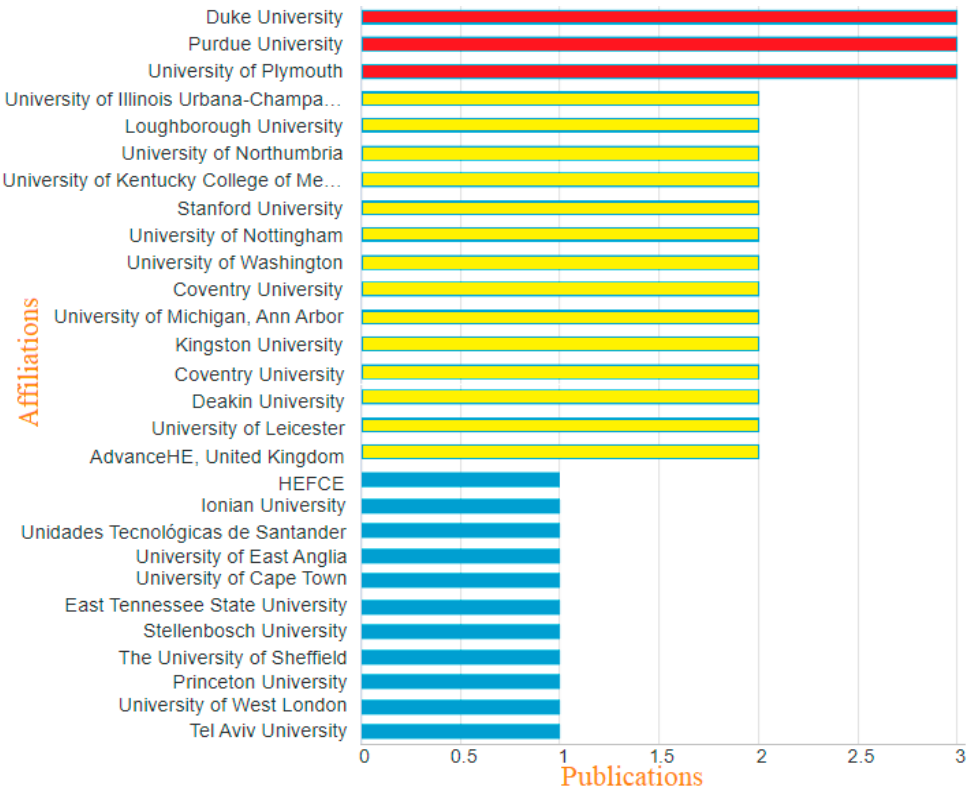

Figure 9. Result of publications by affiliations for the research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" (data retrieved from SCOPUS database on 22 August 2022).

Figure 10. Word cloud for the author keywords research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19" using Voyant tools.

From Figure 3, it was observed that there were different shifts in this subject area, as seen in the pattern of publications from 1993 to 2022. The highest publications were 11 publications in 2014, followed by 10 publications in 2012, followed by 9 publications in 2010, followed by 8 publications in 2018 and 2019, followed by 7 publications in 2016. The second highest occurrence by years was one publication, which appeared five times in 1993, 1997, 1998, 2000, and 2001. The second highest occurrence by years was six publications, which appeared four times in 2010, 2013, 2020, and 2021. It was observed that different global occurrences could have affected the research trends noticed on this subject area, such as the 2008 global economic recession, 2016 drop in oil price, and 2020/2021 COVID-19 pandemic. It was observed that the publications did not increase around these times, but further evidence is required to support this pattern.

It was observed that the publications did not increase around these times, but further evidence is required to support this pattern. With the increase in online learning, there is a decrease in group learning due to the COVID-19 pandemic. It should be noted that group meetings were shunned by the World Health Organisation (WHO), schools were closed during the COVID-19 outbreak globally, and there were national lockdowns which led to fewer peer-to-peer interactions physically. Due to the recent COVID-19 pandemic, which has seen social distancing rules involving remaining 2 m apart and the use of nose masks and hand sanitizers, there has been an increase in online learning as presented in another study [67]. Hence, the publications dropped from eight publications in 2019 to six publications in 2020 and remained as six publications in 2021, and slightly dropped to five publications in mid-2022. This is envisaged to increase as schools have resumed and the post-COVID-19-pandemic era is approaching.

It was observed that the citations from publications on this research showed that there are 11 items from one cluster, as seen in Figure 4. These data were postprocessed using normalization by the association-of-strength method, with a clustering factor of 1.0. The map was generated from bibliometric data using the full counting method for analysing the co-authorship. To avoid bias, the data ignored documents with a large number of authors, with a maximum of 25 authors per document. There were 351 authors with a minimum of one document per author, so the threshold limit was selected With a minimum of five citations per author, 148 citations met this threshold. With the minimum of 10 citations per authors, 75 citations met this threshold. With a minimum of 15 citations per author, 51 citations met this threshold. Using the latter consideration, the total strength of the links for the citations was obtained. It showed that 11 authors had more than five citations in this research area. The authors identified were: Adamchuk D.V., Balanova Y.A., Drapkina O.M., Frolova E.B., Imaeva A.E., Karamnova N.S., Kontsevaya A.V., Muromtseva G.A., Neutroev S.S., Shalnova S.A., and Starikova N.B. However, there are other authors with one document and many citations as identified in Table 1.

Table 1. List of the highest-cited authors per publication showing the citations and total link strength for authors with 1 publication.

Author	Citations	Total Link Strength	Author	Citations	Total Link Strength
Bouldin A.	7	9	Eways S.	7	6
Creekmore F.M.	7	9	Freeman S.J.	8	6
Hammer D.	7	9	Gutteridge C.	8	6
Medina M.	7	9	Hamilton S.C.	8	6
Piascik P.	7	9	Jensen D.	7	6
Pittenger A.	7	9	Kuhr R.	7	6

Table 1. *Cont.*

Author	Citations	Total Link Strength	Author	Citations	Total Link Strength
Rose R.	7	9	Linsey J.	7	6
Schwarz I.	7	9	Orr K.e.	8	6
Scott S.	7	9	Schmidt K.	7	6
Soltis R.	7	9	Suresh P.	8	6
Balik C.	10	8	Talley A.	7	6
Damary I.	10	8	Wood K.	7	6
Golan-Hadari D.	10	8	Ales J.D.	5	4
Hovav B.	10	8	Baygents J.C.	6	4
Kalishek S.	10	8	Bernstein B.A.	27	4
Khaikin R.	10	8	Bright N.S.	27	4
Mayer D.	10	8	Darling J.	7	4
Rozani V.	10	8	Dexter P.	6	4
Segal G.	10	8	Drew B.	7	4
Adi M.Y.	8	6	Gavin C.	7	4
Clarke R.	8	6	Gregg C.S.	5	4

From Figure 5, it was observed that the publications of the search were mostly journal papers or articles (60.7%) which were 68 publications, followed by conference papers (24.1%) which were 27 publications. This was then followed by book chapters (7.1%) which were 8 publications, followed by reviews (6.3%) which were 7 publications. There was also one publication that was a full book and one editorial which were both the least (0.9%). This shows that the most publications on this subject area were available as journal papers.

From Figure 6, it was observed that the subject area of the search with the highest number of publications was social sciences (44.6%) with 75 publications, followed by engineering (10.7%) with 18 publications, then computer science (9.5%) with 16 publications, followed by medicine (8.3%) with 14 publications, followed by business, management and accounting (6.0%) with 10 publications, followed by arts and humanities (5.4%) with 9 publications. The next set each produced 3 publications: health professions (1.8%), materials science (1.8%), and psychology (1.8%), followed by the next set which produced 2 publications each–dentistry (1.2%), mathematics (1.2%), physics and astronomy (1.2%). The rest have one publication each, and include nursing and chemistry, as seen in the funnel chart in Figure 6.

From Figure 7, it was observed that the country with the highest publications is the United States of America (U.S.A.), with 43 publications, followed by the United Kingdom (U.K.) with 37 publications. The next publications were much lower as Australia and the Russian Federation each had 5 publications, followed by the next set of publications whereby each nation had 2 publications (Israel, Italy, Malaysia, Slovakia, South Africa, Spain and Taiwan). The countries with the least publications had 1 publication each (Austria, Brazil, Canada, Columbia, Cyprus, Hong Kong, India, New Zealand, Norway, Saudi Arabia, Serbia, Sweden, Thailand and Ukraine). However, there were five publications that were undefined from the SCOPUS data retrieved from this search. It was also gathered that the U.S.A. and the U.K. are the top two nations from this study, and they are both developed nations that also invest heavily in research into education.

Another aspect of the research trend is seen from the publications where these articles were published as given in Figure 8. This research shows that education is covered across the range of publications. It also shows that education is published by different publishers under different subject titles for the journals on this subject area. With the widespread

across different areas, the highest number of publications found from Scopus database on this area were 3 articles published in the journal called *Teaching in Higher Education*. Additionally, there were other journals that had two publications each, which include various educational research journals listed in Appendix A.

The next aspect looked at are the result of publications by affiliations for the research on "teaching AND higher AND education AND academy AND group AND learning OR COVID-19", as represented in Figure 9. It can be observed that highest publications by affiliations were from Duke University, Purdue University, and the University of Plymouth, as each produced three publications. It was followed by the set of affiliations that produced two publications, which are the University of Illinois, Loughborough University, University of Northumbria, University of Kentucky, Stanford University, University of Nottingham, University of Washington, Coventry University, Deakin University, University of Leicester, and AdvanceHE. The last set of affiliations had one publication each, are detailed in Appendix B.

The last parameter looked at are the author keywords from the search using data retrieved from SCOPUS. It was identified in Figure 10 that the most frequent keywords in the corpus for the word cloud using Voyant tools were education (48); learning (47); higher (23); teaching (19); and practice (11). This can be identified in the word cloud depicted in Figure 10 which was developed using 755 words and 394 unique word forms. From the cirrus on Voyant tools, the word cloud was generated and identified to have a vocabulary density of 0.522, readability index of 32.268, and an average words per sentence of 377.5. Using the most frequent words, a trend was identified as depicted in Figure 11, showing that education is the keyword with the highest relative frequency.

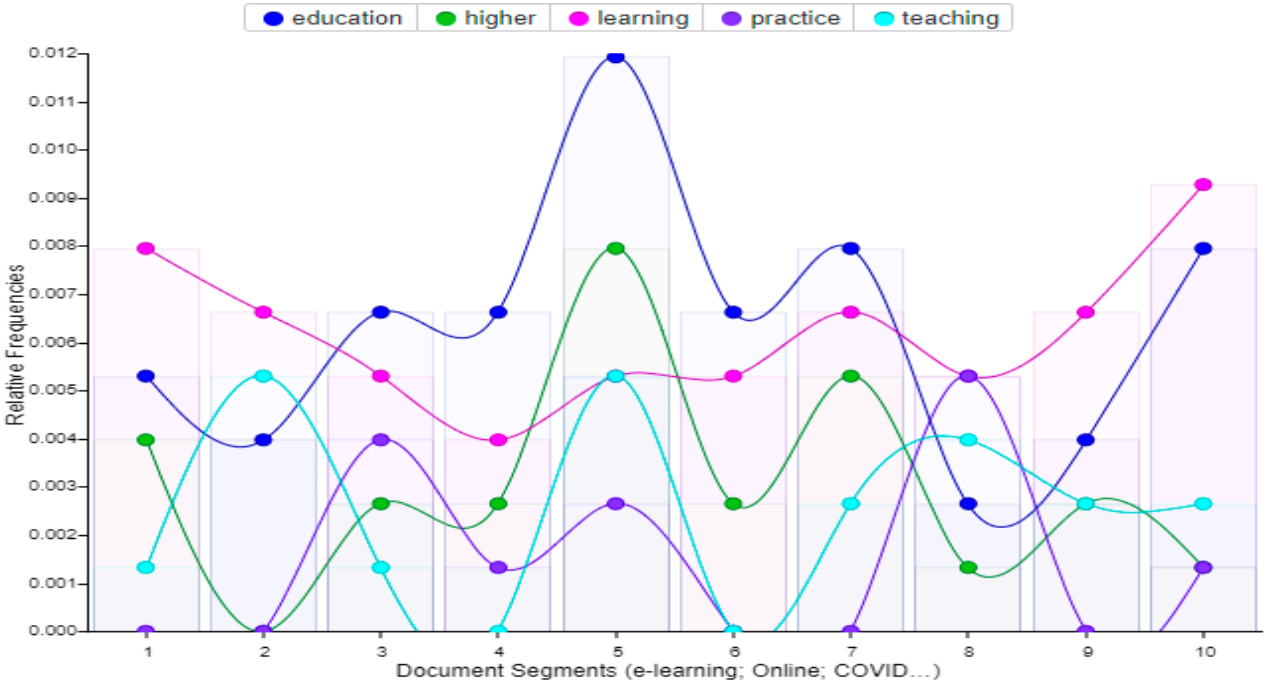

Figure 11. Result of relative frequency and trend from the most frequent author keywords generated using Voyant tools.

4. Group Learning as an Effective Technique

The term "group learning" describes a group of people who are actively working together to solve problems, produce goods, and make sense of the world. Each person participates in group learning both independently and by seeing how others learn. The current article discusses how to introduce group learning, lists its essential characteristics, examines its benefits, describes general tactics for incorporating group work, and describes how to evaluate group work. In group learning, some skills are developed and practised

by learners, such as communication, teamwork dispute resolution, negotiation, critical thinking, values clarity, accommodation, and understanding [20].

In principle, there are two fundamental components to learning: learning on one's own with the aid of one's own understanding and knowledge, and learning in groups or socially within groups. Working in small groups gives students the chance to express their thoughts and understandings, dispel misunderstandings and presumptions, and bargain with others to produce something or come to an agreement. Through group activities, students can learn the material more deeply and develop their thinking abilities. The best group projects involve students in higher-level material that is challenging to comprehend, open to numerous interpretations, or both.

The word "group" means both individual learning that stresses group interaction and the more dispersed type of learning that does not exist inside the head of any one person. Building a communal body of knowledge is the aim, rather than concentrating just on the individual's expertise; learning groups work to produce widely accepted understandings. On the other hand, the word "learning" means the procedures and results involved in resolving issues and producing things that are valued in a culture. This kind of learning places an emphasis on real-world problem solving and engages pupils cognitively, emotionally, and aesthetically rather than concentrating on discrete information that may be created via simple-answer questions.

According to Niharika Gautam [20], group learning is a method of instruction that necessitates meticulous planning and typically employs a facilitator to monitor group progress. It is important to monitor and evaluate how well the group functions and how well the group members learn. The ability of the group to accomplish a common objective is just as crucial as the knowledge and comprehension of the material. Facilitative abilities are crucial, and they call for the teacher to make sure that the task is completed and that functionality and integrity are upheld.

Students are encouraged to build a variety of interpersonal, intrapersonal, presentational, and communicational skills through group learning, all of which are useful in the real world. These crucial abilities are challenging to develop on an individual basis and require constant feedback and contact with group members, which is impossible if the group dynamic is not utilised. Small group learning, particularly that which involves extremely small groups, has drawn criticism from some experts for minimising learner responsibilities and, as a result, decreasing learner motivation. Individuals may neglect their own learning goals in favour of those they share in common with other group members when participating in group learning. In groups with a few highly skilled members, they could also be impacted by the free rider effect.

There are numerous instructional strategies that are ideal for group learning. However, the teaching method which a teacher chooses to employ is entirely up to them. There are several methods for group learning, as summarised in Table 2.

In view of the above, there are some identifiable advantages of group learning in HEIs. By fostering cooperative and collaborative abilities as well as lifetime learning abilities, learners are encouraged to become active rather than passive learners. Secondly, it improves the growth of critical thinking abilities. It also promotes students' academic success and learning. Students have the chance to benefit from and impart knowledge to one another. The students are also motivated by depth rather than superficial learning strategies. It helps learners transfer their prior knowledge and learning more effectively.

Other benefits include learner-centered teaching and learning, with a strong emphasis on assessment. Students actively participate in their own education with group learning. It improves social connections and skills. Additionally, the learning's results are enhanced. There are large groups of students that can be served as well as students that can work on projects simultaneously. The ability to interact and work together on a smaller scale is increased, which lessens the isolation some people feel. Working effectively and efficiently in a group is a necessary skill in the current economic world. The capacity to collaborate with others is frequently cited by employers as one of the most crucial skills business

school grads should have. The factors that affect group dynamics, outcomes, and students' attitudes about group experiences are crucial for teachers to comprehend.

Table 2. Different group-learning methods and their descriptions.

Group Learning Method	Description
Seminars run by students	It is possible for small groups of students (or couples) to lead class (usually tutorials). This is also known as cooperative learning, and this method tries to foster student and teacher collaboration. However, it lessens the teacher's lecture time and promotes student interaction. It can also be applied as a method of evaluation
Games and simulations	Give practise opportunities in "real world" situations when group safety is assured.
Debate or Constructive Arguments	Critic versus defender, prosecutor versus defendant, affirmative versus negative are typical cases to discuss a topic online with a friend or as a group.
Roleplaying	Give a small group of people a scenario or role model to act out. Roleplaying has benefits and drawbacks; be cautious of the subject matter and the activities given to kids. Roleplaying can take many different shapes. Allocating roles to perform to groups or people within groups can be done online.
The Ice-Breakers approach to team building	Icebreakers are a great method to get students acquainted with one another and to feel more at ease in the classroom. They are engaging sessions that take place at the start of the semester. Students can discuss ideas and engage in class more actively due to icebreakers' laid-back atmosphere. As a result of their increased engagement, students are better able to contribute to the success of the lesson.
Brainstorming	In order to generate a list of possible answers, possibilities, and ideas, or provide a trigger, notion, question, or idea.
The fish-bowling method	One group completes a task while another watches it (for example, watching an educational exercise, a roleplay, or a performance), comments on it, and then reacts.
Jigsaw Technique	This is a cooperative learning method with a three-decade track record of successfully minimising racial conflict and raising academic success rates. Similar to a jigsaw puzzle, each student's contribution is necessary for the completion and comprehension of the overall project. Every student is necessary if they are to play their part effectively, which is exactly why this technique works so well. The class for this exercise is called a jigsaw classroom.
SWOT analysis	For brainstorming or concept mapping, use a grid with the headers SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis to organise your thoughts. used to pinpoint and address specific components of the problem
The snowball method	This is described as consolidating groupings of concepts related to the same issue and giving them themes as part of a group activity. Patterns and connections between the groups are noticed per idea conceived or suggested solution; one slip of paper is used and duplicates avoided. A typical instance involves a minimum of five people conducting the meeting who are given five slips of paper, categorised in patterns together such as "similar to similar" or "like to like".
Action Learning	With the help of a small group of about six individuals, action learning is a method for dealing with problems in the workplace. Individuals are able to concentrate on actual problems affecting their work performance and find answers by using the knowledge and abilities of a small group along with persuading questions.
Problem-based instruction (PBL)	PBL varies in definition, but generally speaking involves students working on issues or "Using a question-based or inquiry-based approach to learning, by using scenarios. After being given a scenario, students must use their critical thinking and analysis abilities to investigate or "deal" with it. A great approach to vocational degrees.
The writing game	For the game of writing, a student transmits a message to another student, who then expands on it before transmitting it to a third student. A story unfolds like a mosaic.

In small groups, introverted learners have the chance to speak up and be heard, overcoming the anonymity and passivity associated with large groups. In this approach, the options for instruction, learning, and assessment are expanded. As a result of improved teaching efficiency and effectiveness, faculty members are more enthusiastic about their

work (and the students). Students have the opportunity to work on significant projects (larger in scope or complexity than individual tasks). Learners from various backgrounds are given the chance to speak up, share knowledge and abilities, and take part in various ways (this may provide a new perspective). Time can be saved, but a shared task is necessary. In group learning, there is no individualism but alternative thoughts and viewpoints can be generated. It offers a structured learning environment that can help students get ready for the diversity and realities of the workplace, including working with people from all backgrounds and with varied abilities, cultures, and perspectives.

5. Lessons from the COVID-19 Pandemic

In this section, the lessons learnt from COVID-19 are presented.

5.1. Policy Implications

Teaching assistants and teachers have been in the public limelight during the pandemic, dealing with anything from school closures and home schooling to being praised as national heroes. Without a doubt, teachers have had a difficult time. From being important frontline workers to adjusting to new work practises, they have demonstrated commitment and bravery by putting the needs of the country's children first during a moment of genuine crisis. Teaching has always required resiliency, adaptability, and flexibility, but COVID-19 pushed those skills to entirely new heights [52–57]. Although difficult, the epidemic has given us a chance to reset and recalibrate. Schools, teachers, and institutions that train future teachers have been able to examine what they have done in the past and how they will improve and adapt their teaching and learning in the future.

The pandemic has availed us of new perspectives, and lessons have been learned by institutions as well as their teacher educators during COVID-19 [58–62]. Despite the enormous hurdles during the pandemic, there are positives that will endure over the long term. Due to COVID-19, our entire educational system and organisational structure had to transition to fully remote communication and online learning [63–65]. This means that all the teachers, instructors, and students had to understand that technological improvements are needed to urgently and significantly help address our sustainability challenges given how swiftly they have spread around the world. However, it seemed that educators across a range of subject areas needed to work together with many other disciplines, both inside and outside of business, for academic and professional purposes. In order to provide students with the tools of social power and influence so they may transformatively promote sustainability in their lifetimes, they urged the creation of an integrative curriculum and extracurricular projects that yield tangible and beneficial consequences in each of these sectors.

In order to create and deliver teaching lessons that are in line with interdisciplinary learning outcomes and the United Nations Sustainable Development Goals (SDGs), the teacher could apply blended learning, or building-based learning (BBL), or typical approaches. Complexity, awareness, presentation abilities and confidence, and teamwork(or groupwork) are among the learning objectives that are covered in the article. The recommendations for customising online workshops and webinars using tools like Microsoft Teams, Skype, and Zoom reflect a digital age. Additionally, the teachers have to adapt and acquire more skills to fit the era of this pandemic. To ensure that the students engage appropriately, teachers have had to adopt lesson plans using flip-chart tools or digital tools like Kharhoot! to ensure more student engagement. However, the challenge is that the time that teachers have available for this purpose must be judiciously utilised. The importance of this work lies in its emphasis on and promotion of scenario planning as a teaching tool. As we move into a very uncertain future due to the recent COVID-19 pandemic, scenario planning may prove to be a critical tool for identifying risks and opportunities related to sustainability for teachers, students, individuals, communities, organisations, and, possibly, entire societies.

Training by mentorship enables teachers to communicate better with students via internet correspondence, email, bulletin boards, and online chat, regardless of their physical location. Online tools like Microsoft Teams, Zoom, and Skype are also useful in setting the video meetings. This helps the students to become better equipped to acquire their own information when they feel involved in an activity. The feedback from students is also helpful to the teachers, to improve their teaching skills. Understanding learners' attitudes toward online mentoring is essential to ensuring that learners can benefit from it. Both students and mentors may provide feedback. Higher education institutions (HEI) place a strong emphasis on reflecting on student input and using digital teaching aids like e-boards, projectors, public address systems, and cutting-edge lecture e-kits. With these teaching aids, the student can record the lecture notes on their tablets, mobile phones, and laptop computers, or download them as electronic files so they can be revised at a later time.

Additionally, COVID-19 taught us lessons that intend to identify the shifts in student responsibilities, digital literacy, and learning achievement in online learning environments. There are also online tools that are used in the evolving society, especially with the recent COVID-19 pandemic which led to a national lockdown in most nations. Hence, there was the need to adapt new teaching methods like blended learning and having e-mentorships. E-mentoring aims to increase the less-skilled person's knowledge, confidence, and awareness of other cultures by using electronic communications. It also offers both a context for how it could be better understood in the classroom and a broader understanding of its significance, and gives room for more development of digital tools and the application of technology in learning spaces, HEAs, and also the creation of more online courses.

5.2. Proposed HE Policy Framework for COVID-19 Pandemic

Teaching in HEAs during the pandemic faced challenges in ensuring that students' grades were maintained, while keeping the students' motivation up. However, while the students had a willingness to study, the education sector was dealing with school closures due to the rate of COVID-19 spreading from 2019–2021. Thus, many homes had to resort to home schooling, online learning, social distancing, and the avoidance of group gatherings. In higher education, the idea of active learning is problematic and unacceptable. The following are the most concerning worries. First and foremost, the online mode often results in fabricated grades, reflecting higher education as a market-driven good; second, it profits off the good name of HE without developing or producing new knowledge and skills that future generations need; and third, this so-called online mode only values the idea of active learning in higher education if it increases the bottom line. Although solutions to these issues are required to guarantee active learning in higher education, we should always make sure that HE is in place, especially in times of emergency. Significant policy responses to the COVID-19 pandemic and associated emergencies are described in various studies [59,68].

In the twenty-first century, quitting higher education in the middle of a life-or-death scenario is not an option. To maintain operations, a different approach is offered, but it is not a full substitution or replacement. The fundamental ideas of education, which are the result of a protracted development process and have passed through stringent testing, should not be destroyed by an alternate technique. It is crucial to remember that an educational system needs constant modification and updating, thus any ad hoc or contingent model should not be fully applied until it has received validation. In such cases, Alam and Parvin [68] proposed a policy framework that can handle the provision of education in an emergency. Figure 12 shows the specialised policy framework for HE during a crisis.

To confirm that the higher education sector must continue to function and provide active learning during a crisis, a dedicated taskforce with experts from various sectors (such as higher education, public policy and legislative bodies, ICT, private and public sector leaders, elites, etc.) should be established. This taskforce should ideally design an ad hoc initiative that is properly planned and timed and is able to address current issues. The government should fund and oversee the ad hoc initiative, and it should be one "in which

the governance and regulatory systems are not compromised" to prevent the profit-making mentality from taking hold. Only institutions with a proven track record of value should be allowed to participate. Ad-hoc project completion must be followed by a number of evaluations, both internal and external. A fair ad hoc initiative might assist prevent market players from altering how the HE sector acts during a crisis based on the suggestions of these evaluations. The idea of active learning in higher education could be in risk from a wholly market-driven strategy.

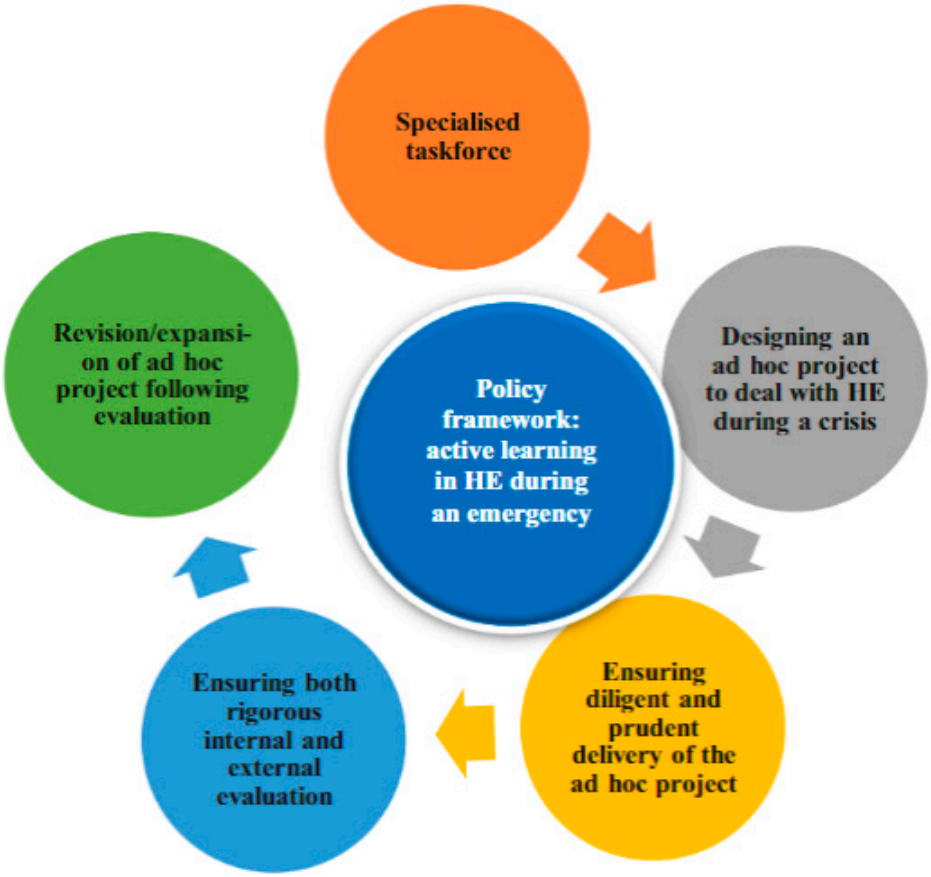

Figure 12. Specialised policy framework for Higher Education during a crisis such as COVID-19 pandemic (Reused with permission from Elsevier Publisher. Copyright year: 2021, Source: [68]).

Policy frameworks for teaching in HE should consider the main components of emergency response, technology adaptation, specialized teachers, training of staff, online support systems, external evaluation, and efficient delivery. It gives credence to the significance of e-platforms and other digital tools. Mobile applications have also been developed to support the application of technology in learning platforms for HEAs and also the creation of more online courses. Presently, online courses like Udemy, Coursera, EdX, Future Learn, and Alison have had increased patronage due to the recent spread of COVID-19 and CoV-2-SARS. These online courses have the advantages of being available at any time, safer as there is no social distancing required, easier because they can be approached at comfort, more flexible for people to learn from, and utilise simpler teaching contents for learners to easily adapt/learn.

6. Annotated Bibliography

In this section, an annotated bibliography on teaching in higher education academies (HEAs) is presented in this paper together with their frontiers in sustainable education. In Tables 3–5 and 8–10, the annotated bibliography from a plethora of publications were listed based on the classifications based on different categories.

Table 3. Some studies related to systematic reviews on teaching in HEAs.

Author	Year	Title	Summary	Ref.
Alam, G.M.; Parvin, M.	2020	Can online higher education be an active agent for change? —comparison of academic success and job-readiness before and during COVID-19	The paper presents a literature review on active learning in education by considering distance and open learning (DOL) during the recent COVID-19 pandemic.	[68]
Sousa, M.J., Marôco, A.L., Gonçalves, S.P., Machado, A.B.	2022	Digital Learning Is an Educational Format towards Sustainable Education	The paper examines how digital learning can be a teaching strategy that emphasises sustainable education.	[69]
Yu, Z.	2022	Sustaining student roles, digital literacy, learning achievements, and motivation in online learning environments during the COVID-19 pandemic	This paper shows that a rapid evidence assessment review study based on the PRISMA protocol can be used to determine student roles.	[70]
Yu, Z.; Deng, X.	2022	A meta-analysis of gender differences in e-learners' self-efficacy, satisfaction, motivation, attitude, and performance across the world	This study presents gender variations from the study's meta-analysis and systematic review.	[71]
Krstikj, A., Sosa Godina, J., García Bañuelos, L., et al.	2022	Analysis of Competency Assessment of Educational Innovation in Upper Secondary School and Higher Education: A Mapping Review	The paper gives light to "educational innovation in teaching" and the "assessment of competencies" in upper-secondary and higher education.	[72]
Suarez, L.M.C.; Nunez-Valdes, K.; Alpera, S.Q.Y.	2021	A systemic perspective for understanding digital transformation in higher education: Overview and subregional context in Latin America as evidence.	This paper gives an understanding of the digital transition in higher education by employing comparative data analysis and archival references. However, the data are based on Latin America.	[73]
Huang, X.Y.; Zou, D.; Cheng, G.; Xie, H.R.	2021	A systematic review of AR and VR enhanced language learning	This paper assesses earlier studies on language acquisition using augmented reality (AR) and virtual reality (VR)	[74]
Crawford, C.; Boyd, C.; Jain, S.; Khorsan, R.; Jonas, W.	2015	Rapid evidence assessment of the literature (REAL): Streamlining the systematic review process and creating utility for evidence-based health care	The paper uses the Rapid Evidence Assessment of the Literature (REAL) SR procedure to analyse clinical research.	[75]
Deng, X., Yu, Z.	2022	A Systematic Review of Machine-Translation-Assisted Language Learning for Sustainable Education	The paper uses machine translation (MT) for the development of artificial intelligence in sustainable education.	[76]
Greenwood, L., and Kelly, C.	2019	A systematic literature review to explore how staff in schools describe how a sense of belonging is created for their pupils	The paper gives a systematic study on how secondary school staff members foster a feeling of community among students.	[77]
Bond, M., Buntins, K., Bedenlier, S., et al.	2020	Mapping research in student engagement and educational technology in higher education: A systematic evidence map.	This paper visualized research on digital technologies and student involvement in 2007–2016 with text-based framework	[78]
Huang, C.	2018	Social network site use and academic achievement: A meta-analysis.	The paper uses social networking sites (SNSs) and academic achievement	[79]

Table 3. *Cont.*

Author	Year	Title	Summary	Ref.
Fehrman, S. and Watson, S. L.	2020	A systematic review of asynchronous online discussions in online higher education.	This paper presents as a main theme the asynchronous online discussions in higher education for 2010–2020.	[80]
Guajardo-Leal, B.E., Navarro-Corona, C., and González, J.R.V.	2019	Systematic mapping study of academic engagement in MOOC.	This is a synthesis of research on student engagement in MOOCs undertaken in 2015–2018.	[81]
Moher, D., Liberati, A., Tetzlaff, J., Altman, D.G.	2010	Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement.	Introduces PRISMA (preferred reporting items for systematic reviews and meta-analyses) and QUOROM (quality of reporting of meta-analyses).	[82]
Safipour, J., Wenneberg, S., and Hadziabdic, E.	2017	Experience of Education in the International Classroom -A Systematic Literature Review	The paper examines the teaching and learning processes in the global classroom from the viewpoints of both the teachers and the students.	[83]
Mitchell, V., Gredley, S., and Carette, L.	2022	Participatory Relationships Matter: Doctoral Students Traversing the Academy	This paper discusses three distinct doctoral paths and interactions with the post philosophies and some webinars	[84]
Carl, M.; Worsfold, L.	2021	The implementation and embedding of digital skills and digital literacy into the curriculum considering the COVID-19 pandemic and the new SQE	The paper presents the development of new digital teaching and resource-delivery models during the COVID-19 pandemic.	[85]
Pearson, J., Giacumo, L.A., Farid, A., Sadegh, M.	2022	A Systematic Multiple Studies Review of Low-Income, First-Generation, and Underrepresented, STEM-Degree Support Programs: Emerging Evidence-Based Models and Recommendations.	The paper uses an empirical method of multi-systematic analysis of 31 articles in 2005–2020. It presents a guide for developing and executing future projects on teaching	[86]

Table 4. Educational research on teaching systematic reviews.

Author	Year	Title	Summary	Ref.
Newman, M., Gough, D.	2020	*Systematic Reviews in Educational Research: Methodology, Perspectives and Application*. In: Systematic Reviews in Educational Research	This chapter examines the steps involved in using literature reviews as a research strategy. The chapter highlights additional reading on important topics in the systematic review process and illustrates the fundamental differences between aggregative and configurative techniques.	[87]
Nind, M.	2020	*Teaching Systematic Review*. In: Systematic Reviews in Educational Research	This chapter is about teaching systematic review that incorporates and expands on knowledge gained from two distinct sets of research experiences. The chapter promotes using in-depth knowledge of the approach and a readiness to be reflective and honest about its messy reality to teach systematic review in ways that foster critical thinking.	[88]

Table 4. *Cont.*

Author	Year	Title	Summary	Ref.
Lloyd-Williams, M., MacLeod, R.D.	2004	A systematic review of teaching and learning in palliative care within the medical undergraduate curriculum	The study is on developing an integrated curriculum for palliative care, with due consideration of the multidisciplinary aspect of palliative care, which is advised to be established within each medical school	[89]
Martin, F., Sun, T., Westine, C.D.	2020	A systematic review of research on online teaching and learning from 2009 to 2018	In the 1990s, 2000s, and 2010s, systematic reviews of online learning research were carried out but no evaluation that looks at the larger scope of research themes in online learning from the previous ten years from 619 research publications	[90]
Shahrol, S.J.M., Sulaiman, S., Samingan, M.R.Z.S.A., Mohamed, H.	2020	A Systematic Literature Review on Teaching and Learning English Using Mobile Technology	To find significant influences on the teaching and learning of English utilising mobile technology as well as existing research that address the problems, a systematic literature review, or SLR, is undertaken. The findings demonstrate that one of the most important success elements for improving English teaching and learning is the use of appropriate educational technology.	[91]
Gamage, S.H.P.W., Ayres, J.R. and Behrend, M.B.	2022	A systematic review on trends in using Moodle for teaching and learning	In STEM education, the Moodle Learning Management System (LMS) is frequently utilised in online teaching and learning. Moodle-related academic research is, however, dispersed across the literature. In order to help three groups of stakeholders—educators, researchers, and software developers—this review summarises this research.	[92]
Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., and Lonsdale, C.	2021	Video Improves Learning in Higher Education: A Systematic Review.	The impacts of video (asynchronous multimedia) on learning in higher education were carefully reviewed. The review found randomised trials that assessed the learning effects of video among college students by searching five databases using 27 keywords for data extraction, bias testing, and full-text screening.	[93]
Noetel, M., Griffith, S., Delaney, O., Harris, N.R., Sanders, T., Parker, P., del Pozo Cruz, B., and Lonsdale, C.	2022	Multimedia Design for Learning: An Overview of Reviews With Meta-Meta-Analysis.	The review aimed to determine the best practises for multimedia design and assess how well certain learning theories fared in meta-analyses. An analysis of systematic reviews that looked at how multimedia design affected learning or cognitive load was undertaken.	[94]

Table 4. *Cont.*

Author	Year	Title	Summary	Ref.
Pigott, T.D., and Polanin, J.R.	2020	Methodological Guidance Paper: High-Quality Meta-Analysis in a Systematic Review.	This article on methodological guidance goes over the components of a top-notch meta-analysis that is carried out as part of a systematic review. When the overarching research issue concentrates on a quantitative synthesis of study data, meta-analysis, a collection of statistical techniques for synthesising the findings of several studies, is applied.	[95]
Fitton, L., McIlraith, A.L., and Wood, C.L.	2018	Shared Book Reading Interventions With English Learners: A Meta-Analysis.	The objective of this meta-analysis was to determine how shared book reading impacts young children learning English as a second language's literacy and language development. The impact of methodological requirements was investigated using sensitivity analyses, and intervention features and child characteristics were assessed as potential moderators.	[96]
Zawacki-Richter, O., Kerres, M., Bedenlier, S., Bond, M., Buntins, K.	2020	*Systematic Reviews in Educational Research: Methodology, Perspectives and Application.*	The book teaches how to do systematic reviews by conducting research on the pedagogy of methodological learning and research methods. It involved teachers and students in the process of enhancing competence and capacity in the collaborative production of understandings of what matters in instructing and learning cutting-edge social science research techniques, such as systematic reviews.	[97]
Newman, M., Bird, K.S., Kwan, I., Shemilt, I., Richardson, M., Hoo, H.	2020	The impact of Feedback Approaches on educational attainment in children and young people. (Protocol for a Systematic Review: Post-Peer review).	This offers a systematic review protocol on the effect of feedback approaches for young people's educational achievement. Teachers place a high importance on feedback in the classroom because it has the ability to significantly influence student results. Feedback is information conveyed to a student with the intention of altering their way of thinking or behaviour in order to enhance their learning.	[98]
Polanin, J.R., Maynard, B.R., and Dell, N.A.	2017	Overviews in Education Research: A Systematic Review and Analysis.	A common method for summarising the constantly growing amount of research and systematic reviews is to use overviews or the synthesis of research syntheses. This study's objectives are to describe the prevalence and state of overviews of education research, to offer more advice for conducting overviews, and to advance the development of overview methodologies.	[99]

Table 4. *Cont.*

Author	Year	Title	Summary	Ref.
Ahn, S., Ames, A.J., and Myers, N.D.	2012	A Review of Meta-Analyses in Education: Methodological Strengths and Weaknesses.	The current review examines the validity of published meta-analyses in education that assess the veracity and generalizability of study findings. The study is used to assess the present meta-analytic procedures in education, identify methodological strengths and limitations, and offer ideas for changes.	[100]
Kluger, A.N., and DeNisi, A.	1996	The effects of feedback interventions on performance: A historical review, a meta-analysis, and a preliminary feedback intervention theory	The feedback on performance from meta-analyses in education is the topic of the current review. Since the turn of the century, feedback interventions (FIs) have had detrimental consequences on performance that have gone mostly unnoticed. Sampling mistakes, feedback signs, or pre-existing theories are all insufficient from a preliminary FI theory (FIT).	[101]
Kyndt, E., and Baert, H.	2013	Antecedents of Employees' Involvement in Work-Related Learning: A Systematic Review.	Participation in workplace learning appears to be more complicated than a straightforward supply–demand match. This involvement can be influenced at various phases of the employee's decision-making process by the interaction of a number of elements. The purpose of this systematic review is to determine those factors that have been linked to work-related learning in earlier studies.	[102]
Lee, S.M.-K., Cui, Y., and Tong, S.X.	2022	Toward a Model of Statistical Learning and Reading: Evidence From a Meta-Analysis.	The human ability to automatically recognise and integrate statistical patterns of complicated environmental data is a convincing example of implicit learning. This skill, known as statistical learning, has been studied in dyslexics using a variety of tasks written in various orthographies. Conclusions about dyslexia's damaged or intact statistical learning, however, are still up for debate. This study used several learning paradigms and distinct orthographies to compare statistical learning across individuals with and without dyslexia from a systematic study.	[103]
Van der Kleij, F.M., Feskens, R.C.W., and Eggen, T.J.H.M.	2015	Effects of Feedback in a Computer-Based Learning Environment on Students' Learning Outcomes: A Meta-Analysis.	The effects of techniques for providing item-based feedback in a computer-based environment on students' learning outcomes were examined in this meta-analysis. Despite the fact that the data revealed that rapid feedback was superior to delayed input for lower order learning and vice versa, no significant interaction was discovered.	[104]

Table 5. Related studies on group learning in HEAs.

Author	Year	Title	Summary	Ref.
Shin, S., Kwon, K., Jung, J.	2022	Collaborative Learning in the Flipped University Classroom: Identifying Team Process Factors.	The aim of this study was to investigate how team-process characteristics in flipped learning connect to students' self-efficacy, attitude, and learning satisfaction. This study investigates how students' choices for collaborative work versus solo work affect their self-efficacy, attitude, and learning satisfaction in a flipped classroom. Lone-wolf students typically lack organisational commitment and have limited patience for the group work process of 34 undergraduate students at a business school from a university in Seoul, South Korea.	[105]
Mohammed, S.S., Baysen, E.	2022	Peer Assessment of Curriculum Content of Group Games in Physical Education: A Systematic Literature Review of the Last Seven Years.	The objective of the study is to comprehensively review the literature on the group game curriculum in physical education (PE) in northern Iraq. Two research questions, "What were the primary research objectives, techniques, and outcomes of the selected studies in this systematic review?" and "What were the major research objectives, methodologies, and outcomes of the studies published between 2015 and 2021?" drove the analysis of eight investigations.	[106]
Fellenz, M.R.	2006	Toward Fairness in Assessing Student Groupwork: A Protocol for Peer Evaluation of Individual Contributions.	The Groupwork Peer-Evaluation Protocol (GPEP), which facilitates the evaluation of individual contributions to graded student groupwork, is presented in this article. The three goals of encouraging student learning, delivering accurate and fair assessment, and facilitating group self-management are what the GPEP is meant to do.	[107]
O'Connor, D., and Yballe, L.	2007	Team Leadership: Critical Steps To Great Projects	This article provides a brief overview of the context for team projects and advances a constructive vision of teams and leadership in response to the difficulty of assigning and carrying out group tasks. The authors present a model that broadens the traditional view of the student-team leadership challenge as well as some guiding principles, resources, and objectives. The writers also provide a number of project worksheets that they have created over the years and that have aided in enhancing group project learning.	[108]

Table 5. *Cont.*

Author	Year	Title	Summary	Ref.
Almond, R.L.	2009	Group assessment: comparing group and individual under-graduate module marks	This article presents a modest study that examined the module grades of a group of science undergraduates over the course of one academic year. It investigated how group summative assessment marking differed from individual assessment in terms of its impact on overall scores. A single cohort of undergraduate science students underwent a group summative assessment (GSA). It is crucial that students are assigned to tutors in a way that reflects the workplace realities, where self-selected teams are uncommon.	[109]
Bacon, D.R.	2005	The effect of group projects on content-related learning	Business schools frequently give their students group projects to help them grasp the course material and develop collaborative skills. However, group goals and individual accountability are two features of efficient collaborative learning tasks that are frequently absent from student group assignments given in business classes. According to the latest study, collaborative projects actually hinder content learning.	[110]
Bacon, D.R., Stewart, K.A., and Silver, W.S.	1999	Lessons from the Best and Worst Student Team Experiences: How a Teacher can make the Difference.	This study empirically pinpoints which teacher-controlled (contextual) factors most strongly influence whether a student will have a positive or negative team experience. The findings show that team experiences are positively influenced by colleagues' self-selection, the duration of the team's experience, and the clarity of instructions given to the team. Peer evaluation utilisation was connected negatively with positive team experiences, contrary to earlier empirical findings and accepted knowledge.	[111]
Holtham, C.W., Melville, R.R., and Sodhi, M.S.	2006	Designing Student Groupwork in Management Education: Widening the Palette of Options.	The authors use the atypical team deployment in a master's in management core course to illustrate innovation in practise. The jigsaw team approach was used in two parallel team uses, one of which involved the team supporting individual effort. The experiences are consistent with the need for faculty teams and individual academics to address the issue of diversifying the groupwork models utilised in management education.	[112]

Table 5. *Cont.*

Author	Year	Title	Summary	Ref.
Baker, T., and Clark, J.	2010	Cooperative learning–A double-edged sword: a coopera-tive learning model for use with diverse student groups.	The study uses surveys and focus groups with local and international students as well as New Zealand (NZ) tertiary instructors who include cooperative learning (CL) in their curricula that were used to gather data. The results show that there is a significant cultural divide in how international students, who have little prior experience with CL, and NZ lecturers, who frequently lack the necessary training to assist international students in bridging the gaps between their previous educational experiences and typical educational practises in NZ.	[113]
Barfield, R.L.	2003	Students' perceptions of and satisfaction with group grades and the group experience in the college classroom.	Higher education academics generally agree that the group-learning approach is a useful teaching and learning technique. While using group projects in the college classroom has many educational, learning, and social communication benefits for both students and teachers, there is a need for a deeper knowledge of group projects from the student's point of view. This study set out to gauge how college students felt about their peers' performance on group assignments and their happiness as a group.	[114]
Cooper, J.	2003	*Group formation in cooperative learning: What the experts say.* In: Small group instruction in higher education: Lessons from the past, visions of the future	The survey on group work is summarised in this chapter. Depending on work time, groups of four are advised (two for shorter tasks). However, the need for groups that require lecturer or tutor management are also discussed.	[115]
Chapman, K.J., Meuter, M., Toy, D., and Wright, L.	2006	Can't We Pick our Own Groups? The Influence of Group Selection Method on Group Dynamics and Outcomes.	This study aims to determine whether group dynamics, outcomes, and students' views toward the group experience are affected by the manner of member assignment (random or self-selected).	[116]
Zeff, L.E., Higby, M.A., and Bossman, L.J.	2006	Permanent or Temporary Classroom Groups: A Field Study	The article outlines the different project kinds that permanent and ad hoc groups will work well for. The results also point to the need for further faculty training on how to design suitable learning environments and projects. Students will need further training in areas like group dynamics and leadership in order to reinforce course content.	[117]

Table 5. *Cont.*

Author	Year	Title	Summary	Ref.
Baixinho, C.L., Ferreira, Ó.R., Medeiros, M., Oliveira, E.S.F.	2022	Sense of Belonging and Evidence Learning: A Focus Group Study.	The achievement of nursing students on the professional and clinical levels requires a sense of belonging. This study sought to determine students' involvement in projects for putting knowledge into practise, which generated a sense of community and facilitated their incorporation into clinical practise services. The study was conducted utilising semi-structured interviews with a group of 15 students divided into two focus groups, using the research question as a springboard for discussion on more focused subjects.	[118]

Table 6. Related studies on teaching and learning to adapt to COVID-19.

Author	Year	Title	Summary	Ref.
Ricaurte, M., Ordóñez, P.E., Navas-Cárdenas, C., Meneses, M.A., Tafur, J.P., Viloria, A.	2022	Industrial Processes Online Teaching: A Good Practice for Undergraduate Engineering Students in Times of COVID-19	Higher education institutions were forced to abruptly switch from face-to-face to online learning due of the COVID-19 pandemic. It was necessary to make adjustments, especially in industrial process training for chemical engineering and associated fields. In order to allow undergraduate students to witness the work of process engineers in professional settings, students were not allowed access to businesses and industries for internships or industrial tours. This essay outlines a teaching tactic to get around this drawback.	[119]
Bamrungsin, P., Khampirat, B.	2022	Improving Professional Skills of Pre-Service Teachers Using Online Training: Applying Work-Integrated Learning Approaches through a Quasi-Experimental Study.	Over the past few decades, there has been a lot of focus on preparing preservice teachers for professional involvement. Finding efficient coaching and training to help preservice teachers (PSTs) improve their professional abilities is crucial. In this study, a proactive online training programme (POTP) was created using a model of work-integrated learning (WIL) activities and teacher preparation. The goal was to assess how POTP had improved the professional abilities of PSTs.	[120]

Table 6. *Cont.*

Author	Year	Title	Summary	Ref.
Avsec, S., Jagiełło-Kowalczyk, M., Żabicka, A.	2022	Enhancing Transformative Learning and Innovation Skills Using Remote Learning for Sustainable Architecture Design.	Although rather useful, current educational technology with artificial intelligence-powered solutions may cause learning to stop because it lacks the social and emotional value that is a crucial component of education for sustainable development and produces an immersive experience through which higher-order thinking skills can be adopted. This study examines a 16-week distance learning course for transformational learning (TL) and developing innovative skills.	[121]
Brumann, S., Ohl, U., Schulz. J.	2022	Inquiry-Based Learning on Climate Change in Upper Secondary Education: A Design-Based Approach.	Inquiry-based learning (IBL) is a viable strategy for overcoming different challenges, according to this study. However, there are many scientifically tested instructional strategies available today, particularly for climate change-related IBL. To promote effective learning processes, the study reported here asks how a science educational seminar for upper secondary schools on the regional effects of climate change should be structured.	[122]
Alyahya, M.A., Elshaer, I.A., Abunasser, F., Hassan, O.H.M., Sobaih, A.E.E.	2022	E-Learning Experience in Higher Education amid COVID-19: Does Gender Really Matter in A Gender-Segregated Culture?	There has been little research on how gender affects students' experiences with electronic (e-) learning at higher education institutions (HEI) despite the abundance of studies on this topic; thus, this paper. In a gender-segregated culture where female students often have more access to technology-based learning than their male counterparts, this research seeks to examine how students differ in terms of their experiences with e-learning while participating in COVID-19.	[123]
Rodrigues, C., Costa, J.M., Moro, S.	2022	Assessment Patterns during Portuguese Emergency Remote Teaching.	Emergency remote teaching (ERT) created significant difficulties for grading student work. This study shows that there is no doubt that COVID-19 has had more detrimental effects on schooling than beneficial ones. Numerous lockdowns caused by the pandemic crisis required millions of students and teachers to continue their studies at home. In Portugal, where the ERT lasted many months in the previous two years, we conducted a survey to better understand the assessment issues teachers encounter during the ERT and their patterns for evaluation.	[124]

Table 7. Related studies on teaching and learning to adapt to COVID-19.

Author	Year	Title	Summary	Ref.
Torres-Díaz, J.C., Rivera-Rogel, D., Beltrán-Flandoli, A.M., Andrade-Vargas, L.	2022	Effects of COVID-19 on the Perception of Virtual Education in University Students in Ecuador; Technical and Methodological Principles at the Universidad Técnica Particular de Loja.	Due to the confinement and migration from face-to-face to open access, online, or blended/hybrid education modes brought on by the coronavirus crisis, education has been compelled to change, although there are severe shortcomings at every level. This work analyses the perspective of a group of students regarding the current state of emergency from a descriptive and correlational quantitative methodological conception of ICT. The primary findings show that students are not yet persuaded that a virtual modality is superior to face-to-face instruction.	[125]
Ota, E., Murakami-Suzuki, R.	2022	Effects of Online Problem-Based Learning to Increase Global Competencies for First-Year Undergraduate Students Majoring in Science and Engineering in Japan.	The goal of this study is to evaluate the learning outcomes and the process of creating skill sets for students majoring in science and engineering at a technical university in Japan. The assessment will be done through online problem-based learning (PBL). The subjects chosen by the group members were all consistent with the SDGs (SDGs). The three skill sets that will be cultivated through this PBL course are multicultural communication and understanding, problem-solving and finding, and global awareness.	[126]
Zhu, Y., Tan, J., Cao, Y., Liu, Y., Liu, Y., Zhang, Q., Liu, Q.	2022	Application of Fuzzy Analytic Hierarchy Process in Environmental Economics Education: Under the Online and Offline Blended Teaching Mode.	The fuzzy analytic hierarchy process (FAHP) was employed in this study to assess students' performance in an online and offline blended environmental economics course (OOBT). OOBT was a brand-new teaching approach that combined traditional offline instruction with an online learning management system. It had the potential to increase students' after-class learning effectiveness and do away with the drawbacks of conventional classroom instruction by utilising an online learning management system. However, there are not many ways to currently assess OOBT pupils' performance.	[127]

Table 8. Related studies on teaching and learning to adapt to COVID-19.

Author	Year	Title	Summary	Ref.
Moustakas, L., Kalina, L.	2022	Learning Football for Good: The Development and Evaluation of the Football3 MOOC.	Sport is becoming a recognised tool for achieving sustainable development goals over the past 20 years. This strategy, often known as sport for development or SFD, is the deliberate use of sport to accomplish development goals. Many SFD organisations use strategies that refocus sport away from its competitive features and promote participation, fair play, and communication in an effort to meet developmental goals. Football3 is a popular Massive Open Online Course (MOOC) technique—"football3 for everyone"—created and freely available for all.	[128]
Galkienė, A., Monkevičienė, O., Kaminskienė, L., Krikštolaitis, R., Käsper, M., Ivanova, I.	2022	Modeling the Sustainable Educational Process for Pupils from Vulnerable Groups in Critical Situations: COVID-19 Context in Lithuania, Latvia, and Estonia.	The COVID-19-induced crisis in education has dramatically decreased the participation of students from vulnerable groups, especially those with low academic achievement. The purpose of this study is to identify the elements that support the best learning outcomes for students from vulnerable groups in general education schools during times of significant educational reform. The study's findings show that self-regulatory collaborative learning improves students' academic performance in a variety of (stable and unstable) educational situations across all three nations for students with emotional and learning challenges.	[129]

Table 9. Related studies on digital literacy on teaching in HEAs.

Author	Year	Title	Summary	Ref.
Hui, J., Zhou, Y., Oubibi, M., Di, W., Zhang, L., Zhang, S.	2022	Research on Art Teaching Practice Supported by Virtual Reality (VR) Technology in the Primary Schools.	Currently, as information technology develops and becomes more widely used, teaching and learning methodologies are continually evolving. The incorporation of virtual technologies is being investigated in several teaching activities. However, it can be difficult to confirm the precise impacts of VR. This research showed that it is simpler to enter mental flow in virtual reality and that the use of virtual reality technology is positively connected with learning engagement after examining the experimental data from the experimental group and the control group.	[130]

Table 9. *Cont.*

Author	Year	Title	Summary	Ref.
Li, M., Yu, Z.	2022	Teachers' Satisfaction, Role, and Digital Literacy during the COVID-19 Pandemic.	Teachers and students across the globe have been forced to switch to an online teaching and learning model as a result of the COVID-19 pandemic. The COVID-19 health crisis has posed challenges to teachers' professional roles, levels of career satisfaction, and digital literacy as compared to traditional face-to-face education methods. The critical appraisal tools to carry out a systematic review included improving the results, by eliminating irrelevant and poorer quality results. They scored each chosen paper with STARLITE to obtain high-quality studies.	[131]
Johnson, C.C., Walton, J.B., Strickler, L., and Elliott, J.B.	2022	Online Teaching in K-12 Education in the United States: A Systematic Review	The 2020 COVID-19 pandemic's requirement that K–12 students receive all or some of their instruction online brought to light the current lack of knowledge of practises that support K–12 student learning in online settings in emergency situations, but more concerningly, in K–12 online teaching and learning more generally. In order to fill this knowledge gap, a systematic review of the literature on K–12 online teaching and learning in the United States was conducted.	[132]
Chen, C.-M., Li, M.-C., and Chen, T.-C.	2020	A web-based collaborative reading annotation system with gamification mechanisms to improve reading performance.	A web-based collaborative reading annotation system (WCRAS) with gamification mechanisms is presented in this study as a means of encouraging students' annotation practises and enhancing their reading comprehension abilities. Using WCRAS with and without gamification mechanisms to encourage digital reading, an evaluation of the effects of the experimental and control groups on students' annotation behaviours, collaborative interaction relationships, reading comprehension performance, and immersion experience was conducted.	[133]

Table 9. *Cont.*

Author	Year	Title	Summary	Ref.
Cardinal, A.	2019	Participatory video: An apparatus for ethically researching literacy, power and embodiment.	The study theorizes participatory video as a means for examining first-year college students' embodied literate practises as they move through various environments. It examines first-year writing students' video diaries and video literacy narratives as part of a 4-year longitudinal study that incorporates feminist pedagogies and decolonizing approaches to educational research. It examines how two women of colour used the camera as a rhetorical tool to address racist occurrences from their literary pasts and to conceal themselves from white audiences' gaze by donning digital personas while generating knowledge about literacy.	[134]
Morris, P., and Sarapin, S.	2020	Mobile phones in the classroom: Policies and potential pedagogy	Mobile phones are allowed for basic classroom activities, according to respondents (74%) but there is no meaningful integration with teaching and learning. Due to the distractions of unrestricted use, many university teachers (76% of those surveyed) have a mobile phone policy in their classes. However, only approximately half of those who enforce phone-free zones for students claim that their regulations are successful.	[135]
Wang, A., and Tahir, R.	2020	The effect of using Kahoot! for learning: A literature review.	A game-based learning platform called Kahoot! can be used to check students' knowledge, for formative evaluation, or as a diversion from routine lessons. With 70 million active unique users per month and 50% of US K–12 students using it, it is one of the most well-known game-based learning systems. Numerous studies on the impact of utilising Kahoot! in the classroom have been published since the platform's inception in 2013; however, there hasn't yet been a thorough review of the findings. The findings of a study of the literature on the impact of Kahoot! for learning are presented in this article, with a focus on how Kahoot! impacts learning performance, classroom dynamics, attitudes and views of students and teachers, and student anxiety.	[136]

Table 9. *Cont.*

Author	Year	Title	Summary	Ref.
Liu, C.-C., Yang, C.-Y., and Chao, P.-Y.	2019	A longitudinal analysis of student participation in a digital collaborative storytelling activity.	Despite the good potential of online social networking sites, there is presently little longitudinal research about how kids engage in digital storytelling communities. According to the social network analysis, students regarded collaboration, language skills, and multiple literacies—including the ability to comprehend multimedia—as key factors in selecting a partner with whom to engage on a collaborative digital storytelling project from educational practise.	[137]
Hou, H.-T., Yu, T.-F., Chiang, F.-D., Lin, Y.-H., Chang, K.-E., and Kuo, C.-C.	2020	Development and evaluation of mindtool-based blogs to promote learners' higher order cognitive thinking in online discussions: An analysis of learning effects and cognitive process.	Blogs are helpful tools for fostering learner involvement and knowledge creation in online educational activities. Contrarily, whereas several studies demonstrate how mindtools support learners' cognitive processes, little study has been done on how these tools affect learners' higher order cognitive thinking in blogs. In order to encourage learners' higher order cognitive thinking in their online interactions and to evaluate their learning impacts, this research created a learning environment utilising a blog that was built using a mindtool and the control group from a quasi-experiment.	[138]
Cheston, C.C., Flickinger, T.E., and Chisolm, M.S.	2013	Social media use in medical education: A systematic review.	In order to respond to two issues, the authors carried out a systematic evaluation of the published literature on social media use in medical education. (1) How have social media initiatives impacted the satisfaction, knowledge, attitudes, and skills of doctors and medical students? and (2) What particular social media-related difficulties and chances have educators run across while putting these interventions into practise?	[139]
Connolly, T.M., Boyle, E.A., MacArthur, E., Hainey, T., and Boyle, J.M.	2012	A systematic literature review of empirical evidence on computer games and serious games.	This study looks at the research on computer games and serious games in relation to the possible benefits of gaming for users 14 years of age and older, particularly in terms of learning, skill development, and engagement. The systematic review involved a comprehensive strategy by using search terms for categorising games.	[140]

Table 9. *Cont.*

Author	Year	Title	Summary	Ref.
Crompton, H., Burke, D., Gregory, K.H., and Gräbe, C.	2016	The use of mobile learning in science: A systematic review.	Mobile learning is becoming increasingly prevalent in the classroom. It is critical to develop a shared knowledge of the research that has been conducted in order to understand how mobile learning is being used most effectively. This systematic review uses a thorough analysis and synthesis of papers from the year 2000 onwards to show the trends in mobile learning in science. The majority of the studies concentrated on creating systems for mobile learning, which was followed by a combination of analysing the outcomes of mobile learning and researching the affective domain while learning on the go.	[141]
Hunsu, N.J., Adesope, O., and Bayly, D.J.	2016	A meta-analysis of the effects of audience response systems (clicker-based technologies) on cognition and affect.	Many instructors who want to boost academic achievement through student involvement have adopted audience-response systems (ARS), which are regarded as an effective technique to use technology to encourage engagement in the classroom. Researchers have looked at how much they support both cognitive and non-cognitive learning outcomes in the classroom, but the majority of their findings are conflicting and ambiguous. This meta-analysis aims to reconcile the divergent results from utilising ARS.	[142]
Kaliisa, R., and Picard, M.	2017	A systematic review on mobile learning in higher education: The African perspective	Mobile devices are now used more frequently in higher education as a result of their popularity and widespread adoption. Studies have examined mobile learning efforts in a variety of settings, but none have looked into this topic in Africa. In order to examine the use, consequences, and difficulties of mobile technology-supported learning, this systematic review compiles and contrasts papers on mobile learning in higher education in the African context that were published between 2010 and 2016.	[143]

Table 9. *Cont.*

Author	Year	Title	Summary	Ref.
Huang, C.	2017	Time spent on social network sites use and psychological well-being: A meta-analysis.	The association between social networking site use and psychological well-being variables like depression, loneliness, and life satisfaction is examined in this meta-analysis. While there was little to no link between time spent on social networking sites and good indicators (such as life satisfaction and self-esteem), there was a slight correlation between time spent on social networking sites and negative indicators (such as sadness and loneliness).	[144]
Hwang G.J., Tsai C.C.	2011	Research trends in mobile and ubiquitous learning: a review of publication in selected journals from 2001 to 2010.	A survey of publications in particular journals from 2001 to 2010 was used to analyse research trends in mobile and ubiquitous learning. Many teachers who want to boost academic performance through student engagement have accepted the usage of mobile learning in science as a good technology-based strategy to increase engagement in the classroom. This meta-analysis aims to reconcile the divergent results. The use of mobile phones in classrooms that used and did not employ mobile learning in science and technologies was specifically taken into consideration from various studies.	[145]

Table 10. Related studies on diversity and cultural differences on teaching in HEAs.

Author	Year	Title	Summary	Ref.
Hines, M., and Fallace, T.	2022	Pedagogical Progressivism and Black Education: A Historiographical Review, 1880–1957	This article provides a critical overview of the literature on the historical development of educational progressivism in the United States throughout the late 19th and early 20th centuries. Others have emphasised how pedagogical progressivism supported movements for liberation and social justice, particularly when adopted by Black educators. While many historians have focused on the overt and covert racism inherent in much progressive pedagogy as advocated by White educators, others have focused on this support. Thus, by include the work of Black researchers, school administrators, curriculum designers, and teachers, the historical approach of pedagogical progressivism is becoming more nuanced.	[146]

Table 10. *Cont.*

Author	Year	Title	Summary	Ref.
Casinader, N., and Walsh, L.	2019	Investigating the cultural understandings of International Baccalaureate Primary Years Programme teachers from a transcultural perspective	The research examining from a transcultural perspective the cultural perceptions of instructors who teach the International Baccalaureate Primary Years Programme. Through teachers' responses to four different facets of transculturalism in pedagogical practise, this study employed an online survey to explore PYP instructors' transcultural attitudes. The findings imply that using the transcultural paradigm, which is more inclusive, will significantly enhance cultural education.	[147]
Caraballo, L.	2016	Students' critical meta-awareness in a figured world of achievement toward a culturally sustaining stance in curriculum, pedagogy, and research	This study presents the junction of student identities and discourses of achievement within an English curriculum in a diverse urban middle school, which is based on a semester-long mixed-methods multicase study. It examines how student identities, languages, and literacies impact learning experiences in the classroom, how teachers react to these factors, and what else—such as youth-led participatory action research—can actively challenge conventional ideas about what constitutes literacy in the curriculum, pedagogy, and research to increase students' awareness.	[148]
Givens, J.R.	2015	*A grammar for black education beyond borders*: Exploring technologies of schooling in the African Diaspora.	The study presents the idea of educational diasporic practise by drawing on research at the intersections of education and the African Diaspora. It discusses how white supremacy has contributed to the misrecognition and (re)production of black people as undeserving of holding the status of human by using Mills' "The Racial Contract" and Althusser's theory of the ideological state apparatuses via a racial lens. It advocates the study of the restorative and epistemological writings of diasporic thinkers like Chinua Achebe and Carter G. Woodson that support the creation of a humanising and liberating language for blackness globally in education and resistance to colonial educational practises.	[149]

Table 10. *Cont.*

Author	Year	Title	Summary	Ref.
Matias, C.E., and Grosland, T.J.	2016	Digital storytelling as racial justice: Digital hopes for deconstructing whiteness in teacher education	This paper uses digital storytelling to investigate the emotionality surrounding race that is pervasive in teacher-education-programme classrooms. It draws on a combination of critical race theory, critical emotion studies, and critical whiteness studies. Teacher candidates used digital storytelling to reflect on how participation in racial discourse in education allowed them to deconstruct their own identities. The need to challenge and question initiatives that advance social justice while excluding whiteness as a topic of inquiry has implications for teacher education pedagogy and creates a space for discussion of the pervasive racism that purports to be socially just and culturally sensitive.	[150]
Mosley Wetzel, M., and Rogers, R.	2015	Constructing racial literacy through critical language awareness: A case study of a beginning literacy teacher.	Utilizes critical language awareness to assess racial literacy throughout three literacy events (a teacher's reflection on white privilege, a literacy lesson exploring race, and a debriefing with colleagues) in a year-long case study of a white preservice teacher and her black pupil. It demonstrates how a key component of becoming a teacher is becoming conscious of race, racism, and white privilege. Using critical literacy as a framework, this example shows how critical discourse analysis and critical language awareness may be used to dismantle prevailing forms of literacy and investigate, critique, and reconstruct understandings of race.	[151]
Ohito, E.O., and Khoja-Moolji, S.	2018	Reparative readings: re-claiming black feminised bodies as sites of somatic pleasures and possibilities	The study challenges the prevailing discourses that ignore and erase black female bodies, especially in curriculum and pedagogical practises, by using the idea of reparative reading. It examines the curriculum using feminist writing techniques and self-reflection to reconsider works like *Caucasia (1999)* and *Sarah Phillips (1984)* as alternate representations of black female bodies that contain pleasure and possibilities. Its conclusion is that examining bodies as texts enables the development of curricula and pedagogies that heal the minds and bodies of people who are vulnerable to and disenfranchised by hegemonic frameworks of racism and gender.	[152]

Table 10. *Cont.*

Author	Year	Title	Summary	Ref.
Pane, D.M.	2015	The story of drama club: A contemporary counternarrative of a transformative culture of teaching and learning for disenfranchised black youth in the school-to-prison pipeline.	This study looks into how three white teachers in an urban educational alternative outreach school are using drama club as a culturally responsive pedagogical tool as part of a year-long programme to validate students' cultures, understand the varied experiences of the community, and transform instruction and learning. There is the use of teachers' narratives and critical reflections on teaching and learning, students' journaling, essay writing, and note-taking, as well as editorials and articles written for the monthly school newspaper that is produced by the students, and (auto)biographical and (auto)ethnographic methods. It investigates the metaphors developed in a student-centered classroom that promote critical thinking and a counternarrative for teaching and learning with and for marginalised black teens.	[153]
Scharrer, E., and Ramasubramanian, S.	2015	Intervening in the media's influence on stereotypes of race and ethnicity: The role of media literacy education.	The question of whether media literacy can act to lessen racial, gender, and ethnic stereotypes is raised by reviewing quantitative and qualitative media literacy studies. It examines a qualitative curricular investigation of violence and stereotypes in the media, looking at writing from 60 primarily white sixth graders who struggled with how media shapes and expands conceptions of oneself and others. The implications for extended class periods, intergroup interactions using stereotypes and counterstereotypes, youth-constructed curricula, and explicit racial and ethnic profiling are discussed in the conclusion.	[154]
Zhang, G., Jia, Z., Yan, S.	2022	Does Gender Matter? The Relationship Comparison of Strategic Leadership on Organizational Ambidextrous Behavior between Male and Female CEOs.	This study intends to investigate how organisational ambidextrous behaviour differs between male and female CEOs in terms of strategic leadership, taking into account the balancing effect and combined effect of exploratory and exploitative behaviours. From 2016 to 2020, a quantitative analysis of male and female CEOs of publicly traded firms was performed using demographic information and pertinent organisational ambidextrous data. The results showed that ambidextrous female strategic leaders do not act differently from their male counterparts.	[155]

Table 10. *Cont.*

Author	Year	Title	Summary	Ref.
Ohta, R., Yata, A., Sano, C.	2022	Students' Learning on Sustainable Development Goals through Interactive Lectures and Fieldwork in Rural Communities: Grounded Theory Approach.	SDG education is essential to inspire people to continue engaging in activities that are in line with the SDGs. Sustainable social resource-based community management and sustainable development objectives (SDGs) are essential for community sustainability and sustainable development, respectively. This strategy divides SDG instruction into three topics and eleven concepts for students. Participants in SDG education that combines interactive lectures with rural fieldwork re-evaluate community and society notions within an SDG-focused perspective.	[156]
Viner, R.M., Russell, S.J., Croker, H., et al.	2020	School closure and management practices during coronavirus outbreaks including COVID-19: A rapid systematic review	The paper presents management strategies for school closures during the recent COVID-19 pandemic.	[157]

7. Conclusions

In this paper, a scientific review with annotated bibliography on teaching in higher education academies (HEAs) is presented together with their frontiers in sustainable education. This study covers literature on reflecting comments, reflective thinking, and reflective behaviour in the classroom. This annotated bibliography is made up of references and their summaries with the authors' views on the collected literature to aid academics, such as professors, workshop tutors, teaching assistants, laboratory demonstrators, postgraduate researchers, and educators in obtaining a comprehensive overview of the literature on the subject to enhance their teaching abilities. Different studies demonstrate how a teacher's teaching skills and assessments may affect the mode of students learning. This is evident based on the studies conducted on teaching styles, student assessment, and group learning. The literature utilised for the annotated bibliography shows that the learner's attitude and the teacher's skills have an effect on the students' learning process.

The scientific review and scientometric analysis conducted was used to understand the research pattern in this area. It is evident that there are key indicators that affect the research pattern on teaching in HEAs. Based on the publication records from 1993 to mid-2022, it was observed that different global occurrences could have affected the research trends noticed in this subject area, such as the 2008 global economic recession, 2016 drop in oil price, and the 2020/2021 COVID-19 pandemic. It was observed that the publications did not increase around these times, but further evidence is required to support this pattern. With the increase in online learning, there is a decrease in group learning due to the COVID-19 pandemic. It should be noted that group meetings were shunned by the World Health Organisation (WHO), schools were closed during the COVID-19 outbreak globally, and there were national lockdowns which led to fewer peer-to-peer interactions physically. Due to this recent COVID-19 pandemic, which has seen social distancing rules involving remaining 2 m apart and the use of nose masks and hand sanitizers, there has been an increase in online learning. Hence, the publications dropped from eight publications in 2019 to six publications in 2020 and remained six publications in 2021, and slightly dropped to five publications in mid-2022, which is envisaged to increase as schools have resumed and the post-COVID-19 pandemic era is approaching. On the one hand, the international lockdowns revealed new loopholes and difficulties, such as the challenge of providing

Chromebooks and laptops for students to use at home during the lockdown. On the other hand, the relationship between technology and education has been growing, which has given education the chance to advance and improve the use of digital technologies in the classroom. In addition, there are advantages adapted from the COVID-19 pandemic leading to learning-readiness and job-readiness in higher education [68,157,158].

It was also observed that the highest publications were produced in the U.S.A. Additionally, it was also gathered that the U.S.A. and the U.K. are the top two nations, and they are both developed nations that also invest heavily on research into education. These affiliations are from various locations, demonstrating that research on education is being undertaken with a focus on teaching in higher education academy. However, the rates of production per affiliation are not very high, which may indicate that there is little funding for this field of study. The survey also reveals that articles and journal papers made up the majority of publications on this topic. Using the most frequent words, a trend was identified as depicted in Figure 10, showing that 'education' is the keyword with highest relative frequency, namely, as education (48); learning (47); higher (23); teaching (19); and practice (11). However, future research can include an annotated biography on teaching in HEAs with themes like student participation, diversity, teaching pedagogy, and blended learning in HEAs. Additionally, detailed scientific literature reviews can be conducted on teaching in HEAs. Further studies should include inclusive learning, teaching pedagogy, socio-cultural differences, and advanced teaching techniques for STEM courses.

Supplementary Materials: The supplementary data used in the study can be downloaded at: Amaechi, Chiemela Victor (2022), "Data on Scientometrics of Teaching in HEA and adapting to COVID-19 (group learning)- Paper 2", *Mendeley Data*, V2, https://data.mendeley.com/datasets/hnjmzhskz3, accessed on 6 September 2022.

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Appendix A List of Some Journals on Teaching and Education in Higher Education

From this study, the list of journals include: *Teaching in Higher Education*, *Diversity In Higher Education*, *International Journal For Academic Development*, *Journal Of Further And*

Higher Education, *On The Horizon*, *Pediatrics*, and *Tertiary Education and Management*, all having two publications each, except *Teaching in Higher Education*, which has three publications. The last set of publications had one article each, and include journals like *Academic Psychiatry*, *Advances In Intelligent Systems And Computing*, *Alt J Research In Learning Technology*, *Arts And Humanities In Higher Education*, *Asian Social Science*, *Atlantic Journal Of Communication*, *Journal Of Education Policy*, *Bioscience Education*, *British Journal Of Educational Studies*, *Cambridge Journal Of Education*, *Cbe Life Sciences Education*, *Community College Journal Of Research And Practice*, *Currents In Pharmacy Teaching And Learning*, *Nurse Education Today*, *Electronic Journal Of Business Research Methods*, *European Journal Of Training And Development*, *Journal Of Higher Education Policy And Management*, *Journal Of Higher Education Theory And Practice*, *Foot And Ankle International*, *Head And Neck Russian Journal*, Health *Information And Libraries Journal*, *International Journal Of Adult Community And Professional Learning*, *International Journal Of Art And Design Education*, *International Journal Of Early Years Education*, *International Journal Of Innovation Science*, *International Journal Of* Learning *Teaching And Educational Research*, *International Journal Of Technology And Design Education*, *International Journal Of Technology Enhanced Learning*, *Journal Of Chemical Education*, *Journal Of Criminal Justice Education*, and *Journal Of Dental Education*.

Appendix B List of Some Universities and Related Higher Education Institutions (HEIs) on Teaching

From this study, it was observed that highest publications by affiliations were from Duke University, Purdue University and the University of Plymouth, as each produced three publications. This was followed by the set of affiliations that produced two publications, which are the University of Illinois, Loughborough University, University of Northumbria, University of Kentucky, Stanford University, University of Nottingham, University of Washington, Coventry University, Deakin University, University of Leicester and AdvanceHE. The last set of affiliations had one publication each, and include HEFCE, Ionian University, Unidades Tecnológicas de Santander, University of East Anglia, University of Cape Town, University of Massachusetts Chan Medical School, East Tennessee State University, Stellenbosch University, Princeton University, Norfolk State University, Western Washington University, The University of Manchester, Uppsala Universitet, Washington State University Vancouver, University of West London, Tel Aviv University, The University of Auckland, University of Houston, Nottingham Trent University, UCL Institute of Education, University of Oklahoma College of Pharmacy, National Changhua University of Education, University of Wolverhampton, Louisiana State University, and Glasgow Caledonian University.

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