Introduction:

During the COVID-19 pandemic, the sudden transition to virtual learning led to several challenges for nursing students. This study aimed to synthesize nursing students’ experiences of teaching and learning during the COVID-19 pandemic.

Content:

A meta-synthesis of qualitative articles were conducted. Three online databases were searched from December 2019 to December 2022. Qualitative studies and qualitative sections of mixed method studies were included.

Summary:

Twenty-four qualitative studies and seven mixed-method studies were included in the review. The findings consisted of one main theme “educational transformation”, and three categories “challenging face-to-face clinical training”, “transition from face-to-face to virtual education”, and “support continua”. The evidence indicated that during this health-related crisis, most of the training was provided as distance learning in various forms. According to the findings, distance education alone cannot replace face-to-face education and is suggested to be considered as a supplementary learning method.

Outlook:

This study provides a comprehensive understanding of nursing students’ experiences during the COVID-19 pandemic, offering practical implications for educators and institutions globally. The lessons learned can inform strategic decisions, policies, and practices to enhance the resilience and adaptability of nursing education in the face of unforeseen challenges.

Keywords:

COVID-19; experience; meta-synthesis; nursing students; learning; teaching

Introduction

Coronavirus 2019 (COVID-19), first appeared in December 2019 in China. It was declared COVID-19 as a pandemic on March 11, 2020 by the World Health Organization [1]. At the beginning of the pandemic, many businesses, and higher education institutions organizations were locked down [2, 3]. Education institutions changed abruptly their interaction with students, affecting over 1.5 billion students in 191 countries [4]. Universities suspended regular teaching in classrooms and rapidly shifted to virtual education to protect students’ lives and stop the
spread of this communicable disease [5]. Many of them need a virtual learning platform [6]. Therefore, virtual learning was the only option for many universities during the pandemic [7].

During the pandemic, the medical universities as educators of the next generation of healthcare providers have also been facing more serious challenges [8]. Among academic disciplines, nursing plays a critical role in promoting public health, and without skilled and professional nurses, health organizations fail to achieve their goals [9]. Nursing students as an important source of social support for patients spend most part of their practical education in the hospital [10].

Exposure to real patients and clinical instructional experiences are considered essential elements of nursing education and development [11–13]. However, inadequate personal protective equipment (PPE), limited availability of COVID-19 laboratory tests, and imperfect infection control plans have been major safety concerns [14, 15]. Many students missed out on clinical nursing programs [8]. Therefore, there were concerns about how to compensate for missed practical lessons and clinical experiences due to the COVID-19 outbreak [16]. In this regard, nursing traditional didactic content was presented using synchronous and asynchronous virtual education platforms [8]. Therefore, virtual education was considered an alternative to clinical education via digital technologies [17, 18]. There were different teaching methods such as offline and online learning, web-based simulation programs, mobile learning, video conferences, and virtual reality [19, 20]. These methods have different characteristics according to technical preparation, delivery settings, measurement tools, and learning approaches [21].

There was a main concern about the quality of educational content for nursing students because they missed out on direct face-to-face interaction with their classmates and teachers and clinical practice with real patients [22]. Therefore, they experienced several challenges such as challenges with technology, changes in relationships with teachers and peers, and stressors related to role strain in the sudden transition to virtual learning [6]. In addition, interruptions to theoretical and clinical education were unexpected for them. These students are faced with too much stress due to no awareness of place, time, and manner of education [23].

Despite these challenges, an opportunity was created to incorporate new knowledge about the transition to virtual learning during the COVID-19 pandemic and future pandemics. Exploring the experience of nursing students of teaching and learning during the COVID-19 pandemic is critical to improving the educational environment, patient safety, and quality of care during future pandemics and any other unexpected conditions that may happen. In this regard, studies have investigated the experiences of nursing students in teaching and learning during the COVID-19 pandemic. However, to our knowledge, there is no study that has synthesised these experiences. Therefore, this study aimed to synthesis nursing students’ experiences of teaching and learning during the COVID-19 pandemic.

### Methods

#### Protocol and registration

This study is a systematic review and meta-synthesis of qualitative articles. Qualitative studies are synthesized with an interpretive approach in the meta-synthesis method [24, 25]. The aim of such methods is to gather and summarise a broad range of participants’ experiences and promote healthcare by facilitating knowledge transition [24]. Therefore, this helped the researchers to integrate and synthesise the nursing students’ experiences of teaching and learning during the COVID-19 pandemic from qualitative studies in order to develop a comprehensive understanding and knowledge. The Preferred Reporting Items for Systematic Review and Meta-Analyses (PRISMA) flow chart was used as a guideline for discovering and selecting all qualitative studies [26]. The protocol of the present study has been registered on the PROSPERO under the code CRD42021296011.

#### Search process and eligibility criteria

The Boolean search technique was applied to identify studies related to the nursing students’ experiences of teaching and learning during the COVID-19 pandemic, using the following keywords: (“nursing students” OR “Nurs* undergraduate” OR “health care student” OR “health science student” OR “pre-licensure nurse” OR “pupil Nurse”) AND (teaching OR education OR training OR learning) AND
the experiences of students from other medical departments were excluded.

Accordingly, authors searched the online databases of Scopus, Web of Sciences, and PubMed (including Medline) from inception to December 2022, without time limits for extracting published studies. The bibliographic cross-references were searched to enhance search coverage. Inclusion criteria encompassed qualitative studies and the qualitative sections of mixed-method articles concentrating on the experiences of nursing students during the COVID-19 pandemic in the context of teaching and learning. The selected articles were required to be published in peer-reviewed scientific journals. Conversely, quantitative articles, those lacking direct relevance to the teaching and learning experiences of nursing students during the COVID-19 pandemic, and studies concentrating on the experiences of students from other medical departments were excluded.

**Study selection**

Searching the databases was conducted by using predetermined keywords. The titles and abstracts of the retrieved studies were independently screened by the authors (SA & MM) during the search process. The researchers made final decisions about the inclusion or exclusion of studies by sharing the results via EndNote software. Furthermore, they performed online conversations to share search results and decide on the next steps of the research, resolve discrepancies, and achieve a consensus on the inclusion of selected articles. The authors extracted and recorded details from each study in the pre-piloted data extraction table after all eligible studies had been selected.

**Quality appraisal**

The Critical Appraisal Skills Programme (CASP) tool was used to evaluate the quality of qualitative studies and the qualitative section of mixed-method articles [27]. The CASP tool includes 10 questions and is a common tool for assessing the strengths and limitations of any qualitative research method [27]. Studies based on this tool are categorized into three areas according to quality: high, medium, and low. Studies with 8–10 criteria are classified in the high-quality area, studies with five to seven criteria are grouped in the medium quality area and those with four criteria or less are grouped in the area of low quality [28]. The two authors (SA & MM) independently checked the quality of the papers using the CASP tool; in case of any disagreements, these were consulted and resolved by a third author (MJ). Any discrepancies between the researchers were resolved by consensus.

**Data collection process and synthesis of results**

The authors created a data extraction table, that contains the first author’s last name, year of publication, country of study, the aim of the study, design, sampling method, sample size, method of data collection, type of data analysis, and main findings. Analyzing data in meta-synthesis is conducted by many varied methods, in order for the number of analysis methods to adjust the number of researchers. In this meta-synthesis, we analyzed the data using the guidelines provided by Thomas and Harden [29]. The synthesis process comprised three interconnected stages, featuring some degree of overlap. These stages involved the initial line-by-line coding of primary study findings, the arrangement of these codes into interconnected areas to formulate ‘descriptive’ themes, and the subsequent formulation of ‘analytical’ themes. In the first step in this process, each study was read carefully and extracted citations from their results/findings section by the two authors independently (MM & SA). Then, the two authors independently encoded each section of the data extracted in all studies and conducted a line-by-line coding. In the second step, we categorized the extracted codes and grouped them into a hierarchical tree construction. In this step, we compared the themes in the studies to match the themes of one study with the themes of the other studies while warranting that the key theme caught the same themes from different studies. Furthermore, the researchers attained a list of descriptive themes very close to the data. Eventually, the last step was the generation of analytical themes which is considered the most subjective step of the analysis. In this stage, the authors immersed themselves in the data by reading and re-reading. Then, they formed the final themes and sub-themes using inductive content analysis [29].

**Data trustworthiness**

Ensuring the trustworthiness of the data was achieved through several strategies. Two reviewers attained a consensus at each stage, before proceeding to the next stage. Furthermore, two qualitative researchers confirmed the data analysis process as peer checking. In addition, triangulation increased the trustworthiness of the data. Triangulation is fairly varied in the context of meta-synthesis. It includes the use of results from qualitative research articles related to the research question. The researchers compared each included study to discover a new interpretation of the nursing students’ experiences of teaching and learning during the COVID-19 pandemic. Therefore, they maintained a triangulation approach throughout the meta-synthesis process. Moreover, the authors were experts and trained in meta-synthesis and performing qualitative research and analysis [30–32].
Results

Search outcome and selection of studies

The results of our search in three databases are presented in Table 1. In the search process, which was conducted using predefined keywords, 1,433 studies were retrieved. After deleting unrelated and duplicate titles, and reading the abstract and full text, 31 studies were finally included for data synthesis. No further articles were added for inclusion in the meta-synthesis during the assessment of the references list of selected articles. The researchers evaluated the quality of the included studies during the full-text appraisal stage. No articles were excluded from the meta-synthesis process based on their quality. The study flow chart, according to the reported preferential cases for systematic reviews and meta-analysis (PRISMA), is shown in Figure 1.

General characteristics of the selected studies

An overview of the included studies (n=31) has been shown in Table 2. Twenty-four qualitative studies [33–56] and seven mixed-method studies [57–63] were included in the review. Five studies were published in 2020, 14 in 2021, and 12 in 2022. Five studies were from Spain [48–50, 58, 59], four from Indonesia [33, 46, 47, 53], four from the USA [34, 36, 37, 55], four from South Korea [39, 41, 43, 62], two from Iran [51, 54], two from Jordan [52, 61], two from Singapore [38, 56], one from South Africa [40], one from Italy [35], one from Norway [57], one from Japan [42], one from Hong Kong [44], one from Sweden [60], one from Croatia [45], and one from Taiwan [63].

Main theme: educational transformation

The aim of the systematic review was to synthesis nursing students’ experiences of teaching and learning during the COVID-19 pandemic. The theme of “educational transformation” emerged from the inductive content analysis to depict nursing students’ experiences of teaching learning during the pandemic. This main theme comprises of three categories: “challenging face-to-face clinical training”, “transition from face-to-face to virtual education”, and “support continua”. Each category also comprises of subcategories, totaling to eight subcategories (see Figure 2).

Before the COVID-19 pandemic, the education of nursing students was in-person. Students had face-to-face communication and interaction with classmates and professors. Clinical skills were acquired in the hospital by providing care to real patients. But with the start of the pandemic, almost all classes were suspended. Then, universities reduced the hours of clinical training and provided most of the students’ training in virtual form. Students who faced virtual education for the first time experienced completely new teaching and learning methods. Therefore, it seemed that some kind of transformation has occurred in education.

Table 1: Results of different stages of the search process.

<table>
<thead>
<tr>
<th>Databases 2019-2021</th>
<th>Total articles in each database</th>
<th>Selection based on title reading</th>
<th>Selection based on abstract reading</th>
<th>Selection based on full-text reading/appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web of science</td>
<td>313</td>
<td>35</td>
<td>35</td>
<td>10</td>
</tr>
<tr>
<td>PubMed (including medline)</td>
<td>571</td>
<td>57</td>
<td>31</td>
<td>9</td>
</tr>
<tr>
<td>Scopus</td>
<td>549</td>
<td>66</td>
<td>35</td>
<td>12</td>
</tr>
<tr>
<td>Manual search/backtracking references</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total of databases</td>
<td>1,433</td>
<td>158</td>
<td>101</td>
<td>31</td>
</tr>
</tbody>
</table>
Category 1: challenging face-to-face clinical training

This category describes the experienced challenging by nursing students with face-to-face clinical training during the COVID-19 pandemic. It included three subcategories “psychological reactions”, “failure to obtain adequate clinical skills”, and “provision of non-comprehensive clinical care”.

Psychological reactions
Students had to spend part of their clinical training in the hospital. They had mixed feelings about the training and being at the bedside. Some students expressed feelings such as uncertainty, isolation, loneliness, fear, anxiety, worry related to possibly getting infected and transmitting the disease to the family, inadequate PPE, and lack of face-to-face practical sessions. Some were not sufficiently prepared to return to the clinical setting and felt dangerous, powerless, disappointed, and disgusted to be in the clinical setting [33, 35, 36, 38, 40, 44, 45, 51–53, 61].

On the other hand, some other students were eager to learn and ready to return to the clinical setting. They felt happy, resilient, and altruistic from gaining new experiences [33, 34, 40, 53]. In addition, during the clinical internship, they considered themselves part of the treatment staff, which made them feel proud and self-confident [35, 53].
### Table 2: Summary of characteristics of the studies selected for meta-synthesis.

<table>
<thead>
<tr>
<th>Authors, Country</th>
<th>Aim</th>
<th>Design</th>
<th>Data collection and analysis</th>
<th>Participant/selection</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heilferty et al. [33], Indonesia</td>
<td>To explore nursing students’ challenges and experiences undergoing clinical rotation programs during the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Semi-structured interviews; content analysis</td>
<td>Purposive sampling; 31 nursing students</td>
<td>The negative emotions in the initial stage, the positive emotions, the competency that was difficult to achieve, strategies for coping and self-care</td>
</tr>
<tr>
<td>Aldridge and McQuagge [34], USA</td>
<td>To describe the lived experience of undergraduate nursing students learning psychomotor skills during the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Semi-structured interviews; phenomenological study</td>
<td>Snowball sampling; eight undergraduate nursing students</td>
<td>Finding my own way, learning the skills, stress of the pandemic</td>
</tr>
<tr>
<td>Barisone et al. [35], Italy</td>
<td>To investigate the clinical placement experiences of nursing students during the Covid-19 pandemic</td>
<td>Qualitative</td>
<td>Semi-structured interview; phenomenological approach</td>
<td>Purposive sampling; 21 nursing students</td>
<td>Learning which surpasses technicalities; confronting dignity issues; feeling treated as an equal in the workspace</td>
</tr>
<tr>
<td>Diaz et al. [36], USA</td>
<td>To explore the perceptions and experiences of nursing students whose clinical rotations were abruptly interrupted by COVID-19’s initial surge</td>
<td>Qualitative</td>
<td>Online survey; inductive content analysis</td>
<td>Purposeful sampling; 26 nursing students</td>
<td>Breakdown of normal systems; feeling alone and the inability to escape; protective factors/adaptability; role identify and formation</td>
</tr>
<tr>
<td>Fio et al. [57], Norway</td>
<td>To explore how second-year undergraduate nursing students experienced learning through virtual simulations during the COVID-19 pandemic</td>
<td>Mixed method study</td>
<td>Focus group, online questionnaires and interview; content analysis</td>
<td>Not specified; 33 nursing students</td>
<td>Learning by self-training; learning from the software (body interact); learning from peers; learning from faculty</td>
</tr>
<tr>
<td>Heilferty et al. [37], USA</td>
<td>To explore the experience of third year baccalaureate nursing students during the outbreak of the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Online survey; narrative analysis</td>
<td>Not specified; 56 letters from nursing students</td>
<td>Narratives of change; narratives of challenges; narratives of thriving</td>
</tr>
<tr>
<td>Hu et al. [38], Singapore</td>
<td>To explore nursing students’ experiences of using home-based learning as a pedagogy during the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Semi-structured interviews; thematic analysis</td>
<td>Convenience sampling; 23 nursing students</td>
<td>Challenges of home-based learning; the effectiveness of homebased learning; students’ motivation to learn</td>
</tr>
<tr>
<td>Kang et al. [39], South Korea</td>
<td>To explore nursing students’ experience of online peer tutoring based on the goal-reality-options-will (GROW) model</td>
<td>Qualitative</td>
<td>Focus group interviews; inductive content analysis</td>
<td>Not specified; 14 nursing students</td>
<td>Initiating a new approach to learning; promoting learning efficiency in multiple dimensions; encouraging perseverance in learning</td>
</tr>
<tr>
<td>Jarvis et al. [40], South Africa</td>
<td>To explore the anticipated and subsequent perceptions of final year bachelor of nursing students returning to clinical practice during the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Focus group discussions; Content analysis</td>
<td>Purposive sampling; 25 nursing students</td>
<td>Primary appraisal and anticipation of returning to clinical practice; contextual influence on primary appraisal; reappraisal to facilitate a successful return to clinical practice</td>
</tr>
<tr>
<td>Jiménez-Rodríguez and Arro-gante [58], Spain</td>
<td>To describe the undergraduate nursing students’ satisfaction and perceptions about simulated video consultations using the high-fidelity simulation methodology.</td>
<td>Mixed-method study</td>
<td>Open ended questionnaire; thematic analysis</td>
<td>Not specified; 93 nursing students</td>
<td>Advantages of simulated video consultations; disadvantages of simulated video consultations</td>
</tr>
<tr>
<td>Authors, Country</td>
<td>Aim</td>
<td>Design</td>
<td>Data collection and analysis</td>
<td>Participant/ selection</td>
<td>Main findings</td>
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<tr>
<td>Jiménez-Rodríguez et al. [59], Spain</td>
<td>To describe this innovative experience and to determine the satisfaction of nursing students, as well as their perceptions when they participate in simulations using this innovative strategy</td>
<td>Mixed method study</td>
<td>Open-ended questions; thematic analysis</td>
<td>Not specified; 48 nursing students</td>
<td>Positive aspects; negative aspects</td>
</tr>
<tr>
<td>Joung and Kang [41], South Korea</td>
<td>To explore the virtual simulation experiences of nursing students through focus-group interviews</td>
<td>Qualitative</td>
<td>Focus group interviews; inductive content analysis</td>
<td>Not specified; 20 nursing students</td>
<td>Glad that the patients were not real people; the bridge between the text world and the real world; supplements needed for virtual simulations to replace clinical practice</td>
</tr>
<tr>
<td>Kazawa et al. [42], Japan</td>
<td>To explore the students' learning experiences of our telehealth clinical practice program by qualitatively analyzing student reports</td>
<td>Qualitative</td>
<td>Not specified; thematic analysis</td>
<td>Not specified; 26 nursing students</td>
<td>Recognition of continued self-improvement to become a nurse and the development of a sense of ethics; improvement of knowledge and practical skills in chronic care nursing; acquisition of telehealth skills; learning through modelling and teamwork, and improvement of self-efficacy</td>
</tr>
<tr>
<td>Kim et al. [43], South Korea</td>
<td>To understand prelicensure nursing students' perceptions and experiences of using virtual simulation as an alternative to clinical practice during COVID-19 pandemic in South Korea</td>
<td>Qualitative</td>
<td>Focus group interviews; inductive content analysis</td>
<td>Not specified; 20 nursing students</td>
<td>Difficulties encountered in using virtual simulation; benefits to student confidence and competence to provide patient-centered care; gaps in satisfaction due to needed improvements</td>
</tr>
<tr>
<td>Lai et al. [44], Hong Kong</td>
<td>To explore and document the positive and negative experiences of a group of Hong Kong Chinese international students studying in the U.K. and U.S. from an insider perspective in the early stage of the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Online focus group interviews; thematic content analysis</td>
<td>Purposive sampling; 25 nursing students</td>
<td>COVID-19-related stressors; cognitive appraisals; coping strategies and support systems; negative impacts and positive gains</td>
</tr>
<tr>
<td>Langegård et al. [60], Sweden</td>
<td>To describe and evaluate nursing students' experiences of the pedagogical transition from traditional campus-based learning to distance learning using digital tools</td>
<td>Mixed method study</td>
<td>Focus group interviews; content analysis</td>
<td>Not specified; 9 nursing students</td>
<td>Didactic aspects of digital teaching; study environment; student's own resources</td>
</tr>
<tr>
<td>Lovrić et al. [45], Croatia</td>
<td>To explore how students perceive the COVID-19 crisis and what their personal experiences were while studying during the global pandemic.</td>
<td>Qualitative</td>
<td>Conventional content analysis</td>
<td>Purposive sampling; 33 nursing students</td>
<td>State institutions and the population in the COVID-19 crisis; students in the COVID-19 crisis; experiences with student life activities; experiences with the organization of work at the faculty</td>
</tr>
<tr>
<td>Authors, Country</td>
<td>Aim</td>
<td>Design</td>
<td>Data collection and analysis</td>
<td>Participant/selection</td>
<td>Main findings</td>
</tr>
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</tr>
<tr>
<td>Mamnuah and Wanto-noro [46], Indonesia</td>
<td>To explore the experiences, especially hopes and needs of the students, while undergoing online learning during the COVID-19 pandemic</td>
<td>Qualitative</td>
<td>Online interview; content analysis approach</td>
<td>Purposive sampling; 6 health students</td>
<td>The students’ expectations on the online learning; the students’ need in the online learning</td>
</tr>
<tr>
<td>Manik et al. [47], Indonesia</td>
<td>To describe Indonesian nursing students’ perspectives regarding the use of sim for nursing.</td>
<td>Mixed-method study</td>
<td>Online survey; content analysis</td>
<td>Not specified; 50 nursing students</td>
<td>Learning to think critically; a realistic and safe learning environment; effectively improving learning; English language, internet networks, and unfamiliarity as barriers</td>
</tr>
<tr>
<td>Mashaal et al. [61], Jordan</td>
<td>To examine the stress levels, stressors, and associated sociodemographic variables among undergraduate nursing students as a result of the transition to distance learning amid COVID-19.</td>
<td>Mixed-method study</td>
<td>Online survey; conventional content analysis</td>
<td>Convenient sampling; 355 nursing students</td>
<td>Huge unorganized workload; lack of standardized distance learning strategy; limited resources; distracting environment</td>
</tr>
<tr>
<td>Park and Seo [62], South Korea</td>
<td>To investigate the factors affecting nursing students’ learning flow in COVID-19 pandemic situations through mixed-method research</td>
<td>Mixed method study</td>
<td>Focus group interview; content analysis</td>
<td>Convenience Sampling, 20 nursing students</td>
<td>Lack of preparation in the starting of virtual classes; adapting and growing in a new learning environment; enhancing nursing knowledge and skills through virtual clinical training; self-regulation difficulties when studying alone due to social distancing; difficulty concentrating when learning online; disadvantages of virtual learning; concerns about academic performance; missing opportunities to enjoy college life</td>
</tr>
<tr>
<td>Ramos Morcillo et al. [48], Spain</td>
<td>To explain the learning experiences and expectations of nursing students about the changes in education from face-to-face to e-learning education</td>
<td>Qualitative</td>
<td>Semi-structured interviews; inductive thematic analysis</td>
<td>Snowball sampling, 32 nursing students</td>
<td>Generating emotions and feelings in times of virtuality; online assessment: a Potential alternative to educational barriers</td>
</tr>
<tr>
<td>Roman et al. [49], Spain</td>
<td>To explore nursing students’ perceptions of the use of a serious game-like model in their final online OSCE.</td>
<td>Qualitative</td>
<td>Focus group; content analysis</td>
<td>Convenience sampling; 89 fourth-year nursing students</td>
<td></td>
</tr>
<tr>
<td>Ropero-Padilla et al. [50], Spain</td>
<td>To explore nursing students’ experiences and perceptions of the use of game elements in two full-nursing subjects using a blended-learning teaching strategy.</td>
<td>Qualitative</td>
<td>Focus groups using semi-structured interview; content analysis</td>
<td>Convenience sampling; 149 s- and third-year undergraduate nursing students</td>
<td>Teaching transition in the COVID-19 pandemic scenario; game elements to retain student attention and learning; gameful designs for competency-based team training; blended learning vs. face-to-face learning including gamification</td>
</tr>
</tbody>
</table>
Failure to obtain adequate clinical skills

In pandemic conditions, universities reduced the hours of clinical training of students, as a result, students had less time to practice skills [34, 54]. In addition, some skills were removed from the training program due to pandemic conditions [34]. Less attention was given to learning skills due to the focus on memorizing precautions. Also, students missed some clinical sessions due to infected COVID-19 [34, 53]. On the other hand, it was difficult to perform procedures and learn skills due to PPE [33, 34]. Therefore, the students lacked competence in performing some procedures and skills [33, 53]. This led to a feeling of unpreparedness and uncertainty in entering the
nursing profession [36, 48], concern about having optimal qualifications and competence as a nurse [54, 62], and the possibility of losing job opportunities due to lack of clinical training. Some students even wanted to delay graduation to complete clinical training.

On the other hand, some students stated that they have easy access to educational facilities [54] and have improved nursing skills due to the shrinking of internship groups [34] and the absence of other students. They felt that they had become a part of the treatment team and were appreciated by the doctors.

Provision of non-comprehensive clinical care
During clinical training, some students took care of patients with COVID-19 and were sometimes reluctant to work with patients with COVID-19 [37]. The patients with COVID-19 were isolated and the students had limited contact with them due to the fear of contracting COVID-19. Hence, the students felt that they neglected the human aspects of patient care and were not competent enough to meet the needs of patients. Therefore, it seems that they provided non-comprehensive nursing care for patients [35, 37, 54].

Category 2: transition from face-to-face to virtual education
One of the most important needs of education during the pandemic was changing learning methods and holding online and offline classes. This category consists of three subcategories “advantages of virtual learning methods”, “disadvantages of virtual learning methods”, and “striving for adaptation”.

Advantages of virtual learning methods
This subcategory describes the benefits of virtual learning methods such as virtual simulation, online tutoring, telehealth, platform-based virtual and online training, virtual Objective Structured Clinical Examination (OSCE), and gamification.

Students described virtual simulation as a useful, enjoyable, new and satisfying learning method [34, 42, 57–59] that improved the understanding and knowledge of patients [41, 58] and feeling relaxed [58] and reduced stress and fear of work with patients [41, 47, 57]. They also stated that virtual simulation is a learning environment similar to reality, safe [43, 47, 57–59] and an opportunity to provide care alone and in emergency situations [43], which has led to increased courage and confidence in providing care [47, 58, 59]. Structured patient assessment [57], improving communication skills [41, 58, 59], learning critical thinking and practical skills, increasing experience in providing care based on evidence-based practice, promoting teamwork [47, 58],

Figure 2: Nursing students’ experiences of teaching and learning during the COVID-19 Pandemic.
receiving immediate feedback from performance and the possibility of repeating exercises [41, 43] were other advantages of virtual simulation.

One of the educational methods during the COVID-19 pandemic was online tutoring. Students reported it as a systematically structured learning style, self-directed learning activity, and a source of happiness. In this type of peer learning method, students needed to prepare educational content. They were able to better focus on learning, identifying the main content of the lesson and unclear parts of the content. Increasing motivation, self-confidence and a sense of success, creating a habit of reviewing and saving time were other positive consequences of this type of learning method [39].

Another online training method was a telehealth clinical practice program. This type of method was able to improve students’ responsibility, remote health assessment skills, scientific and team discussions, and self-efficacy. In addition, it enabled them to have a deep and better understanding of patients’ problems and multidisciplinary cooperation to support patients [42].

Students described platform-based virtual education as useful and life-saving [38, 40, 45]. Instructors used real equipment and creative methods to engage students [37, 56], students experienced different learning situations [55], and learning materials were easily shared [62]. Furthermore, it was possible to replay videos and repeat learning due to the use of videos [46, 51, 55, 62]. In addition, it strengthened self-directed learning, problem-solving skills, self-confidence [52, 62], technology literacy, and creativity in students [34, 38, 53, 55, 56]. Students could study without anxiety and stress, at their preferred time and place [51, 52, 56, 62]. Saving time and money [51, 53, 55, 56, 60], getting higher grades [37], feeling better in control and responsible [60], the possibility of monitoring students during the exam, practicing with classmates through Zoom [56], and promotion of multidimensional insights [63] were other positive experiences of students in the field of platform-based virtual education.

During the COVID-19 pandemic, OSCE virtual was used as an evaluation method. Students described virtual OSCE as good, fair, realistic, objective, and beyond a traditional evaluation and learning method. This evaluation method had a logical sequence of activities that brought experiences such as peace of mind, high concentration, improvement of self-sufficiency and self-evaluation, and saving time [49].

Students described learning through gamification as enjoyable and valuable. They experienced better concentration and learning, improved teamwork, and a sense of accomplishment with gamification [50].

Disadvantages of virtual learning methods

This subcategory describes the disadvantages and challenges of virtual learning methods such as virtual simulation and platform-based virtual and online training.

Despite the advantages of virtual simulation in learning, some students stated that they could not experience the real clinical setting using virtual simulation [41, 43]. They also stated that virtual simulation was not useful for learning practical [41, 58, 59], and emotional and non-verbal communication skills [41, 42, 57]. In addition, not updated educational videos [34], internet connection problems [47, 57–59], the existence of cultural differences [43], English language problems [43, 54], and unfamiliarity [47] were other challenges of the experienced by students in training through virtual simulation. As a result, some described virtual simulation as an ineffective learning method [34] and suggested that the effectiveness of virtual simulation can be increased through group discussion, human-like graphics, grades, and feedback [42].

Additionally, Platform-based virtual education helped students learn during the pandemic. However, the students faced many challenges. They experienced isolation, missing classmates [37, 60, 62], fear, stress, anxiety [37, 38, 52], lack of control, feeling helpless, depression [39], and worry [52, 56] due to the virtualization of education. The time of classes [37, 48, 55, 61] and the amount of homework increased [37, 38, 52, 61, 62] and sometimes there was time interference in online classes [61]. Their relationships with classmates and professors decreased and it was not possible to use library facilities [48, 55, 60, 62]. On the other hand, a suitable and quiet atmosphere at home [37, 38, 48, 52, 55, 56, 60, 61] and digital equipment [51, 52, 62] were not available for online education. Therefore, they felt distracted, had difficulty concentrating [38, 52, 62], had physical fatigue [38, 61, 62], and needing to more effort and time in online learning [37, 62]. Feeling of wasting time [38, 48], delaying learning due to not being forced to read the uploaded content [38, 48], lack of familiarity of professors with evaluation and
online training programs, and managing online class technical problems [55, 56, 61], problem in connecting to the internet [48, 50–52, 55, 61, 62], lack of feedback [48, 50], insufficiency of online training in practical skills [48, 52, 62], using a uniform method for teaching [48], lack of transparency in the way of evaluation [48, 51, 61], distrust of professors to students in online exams [55], low quality of sound and additional sounds in recorded files, brief slides and short [51, 61] were other challenges of virtual education. In addition, it resulted in consequences such as lack of motivation [60, 62], academic failure [37], and the feeling of not learning [37, 38, 51, 54, 60].

**Striving for adaptation**

Students tried to adapt to the new educational conditions in different ways. Some engaged in religious activities, chatting with friends, maintaining interaction with classmates, forming independent study groups, and having a positive attitude towards standards. Others were reading up on the nature of COVID-19, getting useful information and counseling, and strictly following standard precautions. Walking, accepting reality, wearing PPE, and buying PPE were other mechanisms used by students, which ultimately led to students’ adaptation to online education and learning [33, 36, 40, 48, 51, 53, 55, 56].

**Category 3: support continua**

The category of support continua, on the one hand, depicts the support received by students from professors, universities, families, and the government, and on the other hand, describes the lack of support from the university and professors to students. It included two subcategories “adequate support” and “inadequate support”.

**Adequate support**

Students were satisfied with the commitment, good communication, support, giving more time to do homework for students with COVID-19, and the performance of professors [34, 36, 45, 48]. They also appreciated the university’s supportive measures such as providing PPE and adequate information, teaching precautions and suspending classes, and supporting distance education [40, 45]. The families were also worried about their children contracting COVID-19 due to being in the clinical setting and tried to provide the necessary support for the students [40, 44, 51, 56]. Some students felt satisfied with the provision of a free internet package by the government [46].

**Inadequate support**

Despite the support received from the university and professors, students experienced a feeling of lack of support due to delays in receiving PPE [40], lack of PPE [37, 45, 54], and not receiving sufficient training in the use of online training [43, 48, 51], failure to comply with training regulations, and reduction of training standards by professors [54]. In addition, the feeling of disrespect and lack of communication from the faculty, lack of routine program [36], lack of preparation of the faculty to deal with the crisis [44], the ineffectiveness of the university’s virtual learning website [61], technical problems, failure to provide online educational facilities for students, lack of cooperation and low interaction of professors [52] and lack of timely notification of classes [46] were the factors that led to students feel the lack of support from the university and professors.

**Discussion**

This systematic review integrated the results of related studies and synthesized them to provide better knowledge and insight regarding nursing students’ experiences of teaching and learning during the COVID-19 pandemic. Three categories were identified, including challenging face-to-face clinical training, transition from face-to-face to virtual education, and support continua.

The results of this study demonstrated that during the COVID-19 pandemic, nursing students experienced psychological issues such as stress, anxiety, and fear in face-to-face clinical training. Similarly, evidence from a systematic review and meta-analysis showed that the pooled prevalence of fear, anxiety, stress, and depression was 41, 32, 30, and 52 %, respectively [64]. Moreover, a cross-sectional study discovered that Japanese nursing
Students experienced moderate and severe psychological distress during the COVID-19 pandemic [65]. A possible explanation for this finding can be a rapid transmission of COVID-19, deaths from COVID-19, the growing number of infected people, disinformation about COVID-19, and distrust of the health system [66–68].

In this systematic review, it was observed that nursing students expressed a sense of "failure to obtain adequate clinical skills," and "provision of non-comprehensive clinical care." Similarly, the results of a study by Alomari et al. [69] highlighted concerns of Australian nursing students about reductions in the quality and time of clinical training. Clinical practice training is an essential section for integrating theory, student skills, and critical thinking processes in nursing professional practice [70]. In addition, students can develop their professional identities in clinical practice by learning to act and think like nurses [71]. In explaining this finding, it can be said that students have not been able to practice clinical skills due to the closure of universities. Furthermore, they received limited clinical skills training in the clinical environment due to the fear and concern of being infected with COVID-19. As a result, this lack of skill training can be seen as a risk to be present in the workplace. This risk is because they may not be fully equipped with the necessary skills and knowledge, potentially impacting their performance and readiness for clinical practice [69].

Findings from our review indicated that universities replaced virtual education with in-person education and used various virtual learning methods. Any of these methods had advantages and disadvantages. Similarly, the results of a systematic review of the factors and barriers affecting virtual learning in health sciences training highlighted that virtual learning is a time-, cost-intensive approach. In addition, technological illiteracy and inappropriate equipment were reported as virtual learning challenges [72]. Furthermore, Shorey and Ng conducted a systematic review to investigate the evidence on the application of virtual learning. They reported that the lack of realism and technological issues was reported as major disadvantages of virtual education [73]. In addition, the results of another systematic review demonstrated that virtual simulation could improve skills/performance, learning (knowledge), self-confidence, and critical thinking and provide learner satisfaction in nursing education. Moreover, technical issues were reported as an interference factor in the learning experience [74]. Nursing students need patient contact experiences in pre-licensure training. Therefore, is necessary to find creative methods to provide patient contact for virtual training in place of traditional clinical settings in the future [75].

The results of this study have shown that nursing students used varied mechanisms to adapt to the new educational conditions. The findings of a systematic review showed that nursing students used different coping strategies such as problem-solving, avoidance, transference, and staying optimistic [76]. During the pandemic, nursing students experienced life-threatening conditions [77]. Such a stressful environment with social pressure highlighted the need for adaptive mechanisms in students [78]. Since universities play an essential role in helping students to adapt to such an unprecedented situation. Therefore, it seems necessary for universities to consider practical and efficient adaptation mechanisms for students in future pandemics.

This study found that nursing students experienced different levels of support and lack of support during their education during the COVID-19 pandemic. Learning is a social phenomenon. Support from others can accelerate learning [79]. As such, educators and academic leaders can provide support for nursing students through interaction between students and educators and among students in remote learning. This promotes learning, increases engagement, and improves a sense of community among students [72]. Therefore, it is essential to consider the student support system in all aspects including facilities, psychological and physical, educational, and even spiritual.

Since the current research has covered the studies of different countries, pandemic conditions, educational infrastructure, and the context in different countries have not been the same. A diverse range of findings was obtained. Therefore, it is necessary for managers to take steps to improve and promote education in health crisis conditions, according to their background and educational background.

**Implications for clinical practice**

In general, the pandemic conditions caused theoretical and practical training changes, which included positive and negative consequences in all dimensions. These findings should be taken into consideration by managers, professors, and planners in such a way that they try to solve or manage the negative points. Strengthen the positive points and
use these strengths to improve work. Because from now on, we will have this evolution and movement towards
virtual or at least blended training, which is not limited to the era of COVID-19. On the other hand, there is the
possibility of other similar crises such as other emerging diseases or bioterrorism, or war. Furthermore, hospitals can
strengthen their emotional support and the guidelines they provide during future pandemics.

Implications for International Audience

This study provides a comprehensive understanding of nursing students’ experiences during the COVID-19 pandemic, offering practical implications for educators and institutions globally. The lessons learned can inform strategic decisions, policies, and practices to enhance the resilience and adaptability of nursing education in the face of unforeseen challenges.

Limitations

This systematic review had some limitations. First, we included only studies published in English in this review. Second, three databases were searched due to a lack of access to some important databases such as CINAHL. Third, studies in which nursing students were participants along with other students or professors if a separate analysis for nursing students was not available were excluded.

Conclusions

This review explored the nursing students’ experiences of teaching and learning during the COVID-19 pandemic. The evidence indicated that during the COVID-19 pandemic, most of the training was provided as virtual learning in various forms. This type of training had benefits and challenges that would be useful to consider for planning unwanted future crises to improve student teaching and learning. In general, virtual education alone cannot replace face-to-face education and it seems blended teaching-learning methods including in-person and distance education (mixed up different techniques such as synchronous and asynchronous, virtual simulation etc.) is the best strategy. Rather, it is suggested to be considered as a supplementary learning method and student support system in all aspects (facilities, psychological and physical, educational, and even spiritual).

Research ethics: No applicable.
Informed consent: No applicable.
Author contributions: All authors have accepted responsibility for the entire content of this manuscript and approved its submission.
Competing interests: Authors state no conflict of interest.
Research funding: None declared.
Data availability: Not applicable.

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