

## Research Article

# Perception and Challenges of Virtual Classes with Gender Digital Divide amidst and Post-COVID-19 Pandemic in Iraq: An Empirical Analysis

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The COVID-19 epidemic has forced the closure of educational institutions all over the globe since it put academic schedules in peril. To maintain academic activity, the majority of academic institutions have turned to online instruction platforms, which immensely affected instructors' and pupils' one-on-one interactions, among other things, causing a paradigm change in the teaching-learning approach. In light of this, it is essential to examine pupils' perceptions and difficulties associated with online learning amid the COVID-19 epidemic. The current research adopts a sample survey and a quantitative method. In February and March 2022, a sample of 369 Iraqi school pupils was collected using a Google Form Questionnaire. Several statistical methods, including descriptive statistics, factor analysis, reliability, logistic regression, and the Chi-square test, were used to analyze the data in Statistical Package for Social Science. The findings of the study indicated that, on average, students had mixed opinions toward virtual classes during the outbreak because it became a solution to fill the learning gap. On the other hand, inadequate tools and uneven access to the internet make it difficult for students to learn online. The outcome of the logistic regression analysis demonstrates that the number of rooms, family income, father's education, and ICT device all have a favorable impact on virtual classes. Meanwhile, students confronted a lot of challenges in taking online classes. Therefore, the findings of this study will persuade academic institutions and policymakers to improve the effectiveness of online learning with the most modern teaching techniques while also encouraging the government to advance remote regions and foster basic infrastructure and Internet access, narrowing the digital divide and making e-learning more fruitful.

## 1. Introduction

The rapid emergence of COVID-19, a fatal illness, sent shockwaves throughout the globe. The World Health Organization designated it as a pandemic. To combat the spread of the COVID-19 pandemic, most governments throughout the world have temporarily shuttered educational institutions. As per the United Nations Educational, Scientific and

Cultural Organization (UNESCO), the situation is dire as more governments, regions, and even entire countries are closing down educational institutions, and over 91% of students around the world are not enrolled in school or college [1]. Several other nations have enacted localized closures that will affect millions more students, and there is a concern about missing a semester or perhaps more in the near future. Many schools, colleges, and universities have abandoned

onsite instruction, and the traditional teaching style has been changed. As a result of these conditions, educational institutions all over the world are pressuring instructors to switch to an online teaching format. This epidemic has led to frequent school disruptions across Iraq, affecting over 11 million Iraqi children Since February 2020 [2]. And several academic institutions that were previously hesitant to change their traditional pedagogical method had little alternative but to move completely to online teaching–learning [3]. Educators have adjusted their whole pedagogical approach to suit rising market dynamics and respond to changing conditions, resulting in a shift from traditional classrooms to e-classrooms overnight. The challenge in this tough moment is not whether online teaching–learning methodologies can give excellent education; rather, it is how academic institutions can embrace online learning on such a large scale [4].

Following the onset of the COVID-19 epidemic in China, online education has become increasingly popular among the country's colleges. A virtual learning environment (VLE) is a platform for online instruction and assessment that brings together several tools for teachers and pupils to collaborate and interact in a digital setting [5]. An online learning or VLE, according to Poelmans et al. [6], is a multimedia tool that uses information and communication technology and the internet to give educational solutions, support education, and training for both teachers and students. Online learning, remote working, and e-collaboration blossomed during the COVID-19 epidemic. More companies are seeing the advantages of online learning since it is a cost-effective approach to reach a large number of individuals. It has the potential to achieve considerable outcomes by lowering expenses and simultaneously enhancing performance during the COVID-19 shutdown phase. An online educator compensates for the virtual classroom's absence of physical presence by providing a welcoming environment in which all students feel comfortable participating in online classes. It contributes significantly to the transformation of our life into the digital world by providing flexible locations, class times, and high-quality content. It presents a path for humanity's progress.

Even though more and more households are turning to technology and virtual solutions to retain their kid's learning, entertainment, and association with the external universe as a consequence of school shutdowns and stringent containment measures, not all kids have the required infrastructure, information, and abilities to stay safe online [7]. However, amid this crisis, e-learning has significant negatives, such as hampered interaction between the student and the teacher, as well as a loss of personal touch. Users may experience a variety of technological obstacles that obstruct and slow down the teaching and learning process [8]. Switzerland, Norway, Austria, the United States, Australia, and Indonesia all have issues with online education because of the large disparity between affluent and impoverished pupils. While some schools and governments have provided pupils with digital technology, many others are afraid that the epidemic would increase the digital gap [9]. This increases the possibility of dropping out of children from school due to a temporary loss of learning. Correspondingly, economic growth

and the formation of human capital will suffer greatly in the long run. And these obstacles caused unprecedented uncertainty and an uncertain future for the education of pupils. There have been limited studies [17–19] that address the problems, but they have only been able to give a few recommendations. Nevertheless, distance education settings mean that more academic collaboration is needed to keep improving and developing the experience. Therefore, the purpose of this study is to analyze, evaluate, and provide relevant suggestions regarding online learning with the assistance of students' perceptions and challenges they encountered during the COVID-19 pandemic.

Albeit, the main area of concern is the quality of education, which is strongly tied to how well the information is created and delivered. For effective learning, it is necessary to identify and resolve the obstacles that students confront in online classes. This research is significantly very pertinent in light of the fact that the concept of virtual learning has never been implemented on this level in Iraq; it resembles a gigantic social trial. In this light, this research aims to analyze Iraqi students' perceptions as well as challenges toward online education and students' attitudes toward teachers in e-learning so that their perception would be used to improve course designs and learning methods in academic institutions after the COVID-19 outbreak. Undoubtedly, the opinion of adolescent people is a significant source, particularly during and after the COVID-19 epidemic [10]. The experiences that young students have about their challenges and requirements can be very valuable to effectively incorporate a well-organized and more engaged approach to online learning into the curriculum after the epidemic. The rest of the paper deems it so: the upcoming section focuses on a review of the literature with research gaps. Section 3 covers the research objectives, and Section 4 presents research methodology. Section 5 deals with results and findings with discussions. Section 6 concludes the paper, and Section 7 provides some policy recommendations. Section Additional Points delineates the limitations and future scope of the study.

## 2. Literature Reviews

Due to unprecedented crises like the COVID-19 pandemic, all schools and institutions throughout the world have been shut down to prevent the virus from spreading. Traditional classrooms have given way to virtual classrooms, and remote education will be commonplace by 2020. VLEs, or virtual learning environments, are quickly becoming an important aspect of the teaching and learning process for maintaining the academic interest of learners during an outbreak [11]. It has both advantages and disadvantages. Virtual learning saves money on travel and other expenses and allows students to access various learning tools, such as program information, course content, instructor help, discussion boards, document-sharing systems, and learning resources, at any time and from any location [12]. Even before the COVID-19 epidemic, other research on student satisfaction with online learning had been done. The majority of students welcomed digital learning, as revealed by one research that

investigated their degree of satisfaction with e-learning [13]. In addition, another study found that students preferred online learning over face-to-face learning [14]. Notwithstanding, several research revealed that students prefer face-to-face instruction over online instruction [15, 16] because the bond between instructors and pupils has changed as a result of digital learning since instructors are unable to provide special attention and care to pupils who require it and are physically exhausted.

Research on students' perception toward e-learning during the COVID-19 era from Pakistan Medical University shows that students have a negative perception toward online learning as they opined that e-learning has minimal effect on their ability to learn. And they did not favor virtual teaching over traditional teaching during the lockdown because pupils are not yet prepared for online education [17]. Another research from the Philippines indicated that virtual learning has been difficult for the majority of institutions and colleges as some students felt anxiety, headache, and stress as they spent long hours on screen taking online classes. Furthermore, students were unwilling to adopt the online-blended learning strategy because of technological and financial restraints [18]. Similarly, some students' experiences with online learning are unsatisfactory due to a lack of communication between professors and students, as well as their perseverance and effectiveness. There are times when teachers are unable to comprehend the level of student participation, particularly the level of emotional engagement. As a result, in an online learning environment, it is critical to assess and research student engagement, assist teachers in understanding student engagement and intervening at the appropriate time, assist students in reflecting on their learning actions, and facilitate their deep involvement in the learning process [19, 20].

Another study utilized a qualitative method to understand the perceived impact of the COVID-19 lockdown on the adolescents of England. The study mentioned that when early adolescents transitioned to online learning, they began to miss time with their classmates and being in the school setting. And most of the respondents reported that it is difficult to accomplish work without a basic infrastructure and lack of teacher support in online learning. They felt a range of emotions, such as rage, annoyance, anxiety, melancholy, boredom, and perplexity during the lockdown [21]. Furthermore, New Zealand learners claimed that they were devoting less time to their studies and learning less at home as compared to school. They faced several challenges in virtual classes, such as a lack of motivation that was attributed to a variety of contextual factors, such as family responsibilities, such as caring for younger siblings or helping around the house or farm; distractions, like Netflix or online shopping; difficulty accessing teacher or peer assistance [22].

Although online learning is not a new concept, it has received a lot of attention as schools, colleges, and universities make the transition. Scholars have questioned whether schools, colleges, and universities are ready to move to online learning [9, 23, 24]. The availability and capacity of existing school technology, infrastructure, and resources to support

online learning have also been called into question [25]. Nonetheless, many schools in developed countries have been successful in making the transition [15, 26, 27]. However, some obstacles will inevitably arise, such as students' access to an internet connection and personal computers at home to utilize for online instruction. All teaching and learning must take into account students' perceptions of their participation and focus [28]. Additionally, both parental and teacher viewpoints on virtual classes can be helpful. On the other hand, students' self-report may provide a greater knowledge of the personal experiences and obstacles confronted by them. Several recent research [17–20] investigations have focused on the issues with e-learning that university learners experienced throughout the COVID-19 epidemic, and they mainly focus on the negative perspective of virtual classes but neglecting to consider how school students perceived taking online classes at this time. So, the current study intended to explore both sides (positive and negative) aspects of e-learning and the difficulties that students encounter when taking classes online. The purpose of the current research is to fill this research gap.

### 3. Research Objectives

The objectives of this study should be formulated as follows:

- (1) To examine school students' perception of online learning due to the closure of schools amid the COVID-19 pandemic.
- (2) To analyze the challenges and concerns confronted by school students in virtual classrooms during the COVID-19 outbreak.
- (3) To evaluate the students' attitude toward teachers regarding online classes during the COVID-19 pandemic in the Kurdistan region of Iraq.

### 4. Research Methodology

This study looks at the perception as well as the obstacles of school pupils in the Kurdistan region of Iraq concerning online education. The method utilized in this research is a quantitative and sample survey approach. Both primary and secondary sources of data are used in the present study. The participants in this study were school pupils who were chosen by using a simple random sampling method. Primary data were gathered via a standardized Google Forms questionnaire, and secondary data were utilized from different sources, such as the World Bank, UNSECO, and UNICEF reports, with some websites and newspapers. During February and March of 2022, a sample of 369 students from numerous Iraqi schools responded to the survey. A five-point Likert scale-based statement ranging from "Strongly Disagree" to "Strongly Agree" is posed to assess the degree of perception and challenges of e-learning faced by students, with one indicating strongly disagree and five indicating strongly agree. The data were analyzed using the Statistical Package for Social Science version 20.

For data reduction and to uncover underlying factors evaluated by the observed components, the principal

component analysis (PCA) was applied. The reliability and internal consistency of the questionnaire were evaluated by using Cronbach's  $\alpha$ . Statistical techniques, such as logistic regression, descriptive statistics, and Chi-square ( $\chi^2$ ) test, were also applied to analyze the data.

*4.1. Questionnaire Appendix.* The researchers partially adapted the questionnaire that Khan et al. [29, 30] and Kamal and Illiyan [31] developed and partially created their own questionnaire based on a review of the relevant literature. There were three sections consist of the questionnaire. The first section draws data on the pupils' demographics, as well as the ICT gadgets and online platforms utilized by them [29]. The researcher asked questions related to students' demographic profiles such as their gender, age, class, nature of school, no. of rooms in the house, family size, parents' education, occupation, and income. Further asked questions related to which online device (computer, laptop, mobile, or both) and platform (Zoom, Google Meet, WhatsApp, Adobe Connect, school website) used by them.

The second section of the questionnaire examines students' perceptions and challenges about digital learning during the COVID-19 pandemic [29, 30]. The statements asked by researcher related to students' perception toward online learning during COVID-19 pandemic such as the computer-mediated-system is used to enrich the quality of the student learning experience, the tasks and activities that teachers provide during online classes help to understand the course material better, the virtual classes are constructive for your study, online learning is minimized travel expenses and upgraded skills during COVID-19 pandemic, e-learning allows me to learn anywhere at any time, I feel that my background and experience will facilitate me to involve more in online studies, technology development (signal and electricity) of Iraq enables me to join e-learning, I am able to work in order to earn money while I am taking online classes from home, I bear the burden of expenses on internet data due to online classes, cheating is commonly found in the implementation of e-learning, with the existence of online education, pandemic disrupt my future plan and career and boys could have greater access to personal phones and Internet connectivity for online classes as compare to girls.

Additionally, the authors asked questions related to students' challenges toward online learning during the COVID-19 pandemic, like the lack of ICT infrastructure like computers, smartphones, and internet affecting my participation in online classes, The paucity of electricity is always a hurdle to absent me in online classes, I am having problems while completing my assignments because of technical issues, I confronted online distractions such as social media during virtual classes, I experience an emotional disconnect or isolation during virtual classes, I am unable to manage my own thoughts, feelings, and behaviors during virtual classes, lack of past experience on using online tools, low motivation for study in online classes, lack of interaction with teachers in virtual classes and monthly stipend of my father is very little cannot help me to buy internet card in order to not miss the online classes.

The third section gathers data related to students' perceptions of teachers concerning online education [31], which

TABLE 1: Demographic profile of the sample students.

Variables	Categories	Data in number (N)	Percentage (%)
Gender	Male	201	55.5
	Female	168	45.5
Age	16–18 years	82	22.2
	18–20 years	206	55.8
	More than 20 years	81	22.0
Class	Class 9	56	15.2
	Class 10	118	32
	Class 11	105	28.5
	Class 12	90	24.4
School	Government	187	50.7
	Private	164	44.4
	Aided	18	4.9

Source. Authors' calculations based on a Google Forms questionnaire.

includes the statements that teachers did transmit instructions better in online classes than offline classes, teachers verify whether we have understood the lessons by seeking feedback or encouraging us to ask more questions, I can ask any questions to my teacher and receive a quick response during online classes, teacher is more satisfied with modern platforms and has positive attitude toward e-learning, school and government have expressed willingness to help students with the provision of equipment needed for participation in e-learning. All the statements were asked on the basis of 5-point Likert scale from 1 to 5, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

## 5. Results and Findings with Discussion

The demographic profile of the learners, the ICT tools they utilize for e-learning, their perspectives regarding virtual classes, the obstacles they confront, and other pertinent information are described in this part.

*5.1. Demographic Profile of the Sample Students.* The demographic characteristics of the students who responded are shown in Table 1. It reveals that more than half of student respondents were male (55.5%), whereas 45.5% were female students. Most of the respondents (55.8%) belong to the age group of 18–20 years, 22.2% are between the age of 16–18 years and 22% of students are above 20 years. Almost 15% of the respondents were in grade 9, while 32% were in grade 10, 28.5% were in grade 11 and 24.4% were in grade 12, respectively. Half of the respondents (50.7%) were studying in government schools, while 44.4% of students were in private schools, and the remaining 4.9% of students were from aided schools.

*5.2. Parents' Socioeconomic Condition of Respondent Students.* The socioeconomic status of the respondent students' parents can be seen in Table 2. It depicts that fathers and mothers have poor educational status; many of the respondents' parents were illiterate, with 14.4% of fathers



TABLE 2: Parents' socioeconomic condition of respondent students.

Variables	Categories	Father (%)	Mother (%)
Parents education	No formal education	53 (14.4)	87 (23.6)
	10th passed	116 (31.4)	75(20.3)
	12th passed	110 (29.8)	71 (19.2)
	Graduation	62(16.8)	81(22)
	Postgraduation	28 (7.6)	55 (14.9)
Parents occupation	Business	5 (1.4)	0 (0)
	Government job	155 (42)	129 (35)
	Private job	142 (38.5)	128 (34.7)
	Daily wage earner	16 (4.3)	17 (4.6)
	Unemployed/housewife	51 (13.8)	93 (25.2)
Parents monthly income	100–300 \$	10 (2.7)	
	300–500 \$	99 (26.8)	
	500–700 \$	217 (58.8)	
	More than 700 \$	43 (11.7)	

Source. Authors' calculations based on a Google Forms questionnaire. Note. 1 \$ = 1,462.13 Iraqi Dinar.

TABLE 3: ICT devices used in virtual classes by respondent students.

Statements	Categories	Percentage (%)
Taking virtual class	Yes	98.9
	No	1.1
ICT device used by students	Computer	22.5
	Laptop	37.7
	Mobile phone	30.1
	Both mobile phones and laptop	9.8
Number of rooms in house	One	0.0
	Two	4.6
	Three	53.8
	More than three	41.6
Want to return to school after reopening it	Yes	66.1
	No	1.1
	Maybe	32.8

Source. Authors' calculations based on a Google Forms questionnaire.

and 23.6% of mothers. Most respondents' fathers, i.e. (31.4%) and 20% of mothers, were educated up to 10 grades. Overwhelming respondents' parents were engaged in small government jobs (which include clerks and caretakers), i.e., 42% were fathers and 35% were mothers. More than 35% of parents were doing private jobs. Around 14% of respondents' fathers were unemployed, and one in four mothers was a housewife. A total of 59% of the respondent's average monthly family income is around 500–700 \$, while 26% belong to the 300–500 \$ income group, and only 11.7% of respondents have a more than 700 \$ average monthly income. This indicates that the overwhelming numbers of the respondents are from the low socioeconomic classes.

*5.3. ICT Devices and Online Platform Used in Virtual Classes.* Table 3 reveals that online classes are taken by 98% of respondent students. Most of the students (37.7%) used their laptops to take online classes, whereas 30.1% of students used mobile phones. Students faced poor internet connectivity,

electricity outages, and the inability to share and access content via mobile phones while taking online classes [32]. In Iraq's schools, the Zoom app is the most popular tool for taking online classes (28%), while Adobe Connect was used by 27% of pupils. The third preferred online platform utilized by the student was Google Meet (24%), followed by WhatsApp group (12%), and the school website (9.5%), as illustrated in Figure 1. India's students also used free online platforms like ZOOM and Google Classroom to take online classes. However, they are not the safest or more secure instruments for learning purposes. Data privacy and security are a source of concern, which is constantly linked to it [33]. Most of the respondent pupils come from large families with greater than five people (21% of the learners were from families of five people, while 13% had six members in the family). Further, the researcher asked the students about do they want to return to school after reopening it. It was revealed that 66% of students want to return to school after reopening it, while 32.8% may not be sure about it, and 1.1% of students

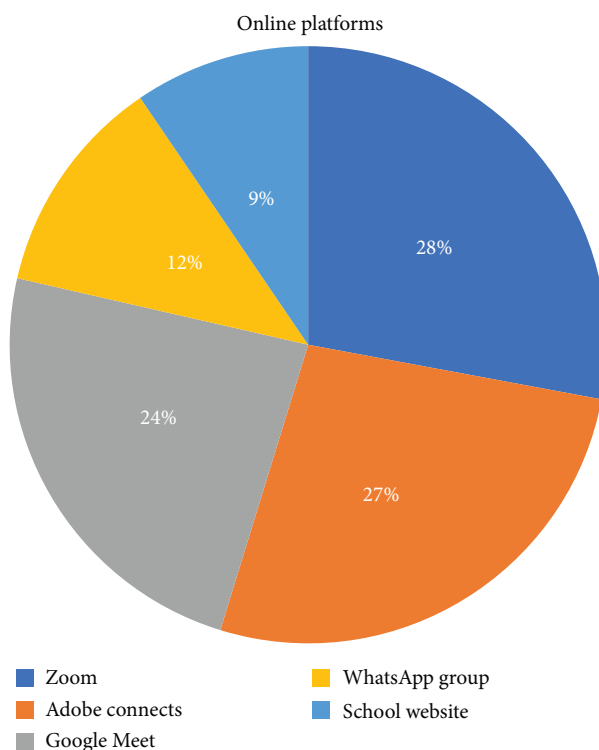


FIGURE 1: Online platform used in virtual classes. *Source.* Authors' calculations based on a Google Forms questionnaire.

TABLE 4: Result of logistic regression.

Dependent variable = probability of online classes	<i>B</i>	S.E.	Wald	Df	Sig.	Exp( <i>B</i> )	95(%) CI for EXP( <i>B</i> )	
							Lower	Upper
Father's education	2.042	0.981	4.337	1	0.037	7.706	1.128	52.664
Mother's education	-0.425	0.511	0.690	1	0.406	0.654	0.240	1.781
Father's occupation	-0.382	0.578	0.437	1	0.509	0.682	0.220	2.120
Monthly income of family	1.469	1.070	1.884	1	0.170	4.345	0.533	35.402
No of rooms	7.370	1.884	1.567	1	0.907	1.440	0.345	1.304
Family members	-1.011	1.594	0.765	1	0.001	0.904	0.713	4.654
ICT device	5.162	8.683	0.345	1	0.093	1.745	0.234	6.345
Constant	-16.920	6.810	6.173	1	0.013	0.000		

$p > 0.05$ , R-square = .39 (Cox & Snell), .34 (Nagelkerke). *Source.* Authors' calculations based on a Google Forms questionnaire.

do not want to rejoin school after the pandemic. The World Bank [2] report found that Iraqi students are experiencing a sharp fall in learning-adjusted school years, simultaneously confronting more than a "lost year" of education.

**5.4. Online Classes and Their Determinants—Logistic Regression Analysis.** The logistic regression model was applied to determine the extent of the variables that have a significant impact on online classes. Here, the dependent variable was the probability of joining online classes or not, which was dichotomous. It establishes the log odds for a specific outcome. If  $\pi$  is the probability of taking online classes, then  $(1-\pi)$  is the probability of not taking online classes. So,  $\pi/(1-\pi)$  is simply the odds ratio in favor of taking online classes—the ratio of the probability that a student will take online classes to the probability that they will

not take online classes [34]. A positive value beta implies that the odds are in favor of the event, while a negative value shows that the odds are unfavorable to the event [35]. We can see from Table 4 that the number of rooms has a positive beta coefficient, which indicates that with a rise in the number of rooms in the house, probability of taking online classes is enhanced. And ICT device has also positive beta coefficient because a majority of students (38%) were using laptops to take online classes, which seems to be an appropriate device for taking online classes. One study found that we prefer to use laptops more consciously for more precise goals than we do our mobile phones. Mobile devices can foster multitasking and distraction, which is detrimental to learning [36]. A value of Exp. (B) for the father's education is more than one implying that for one level increase in the father's education, odd for pursuing virtual classes

TABLE 5: Principle component analysis for perception.

Components	Statement retained	% Of variance explained
Positive perceptions	(1) The computer-mediated-system is used to enrich the quality of the student learning experience	48.52
	(2) The tasks and activities that teachers provide during online classes help to understand the course material better	
	(3) The virtual classes are constructive for your study	
	(4) Online learning is minimized travel expenses and upgrades skills	
	(5) E-learning allows me to learn anywhere at any time	
	(6) I feel that my background and experience will facilitate me to involve more in online studies	
	(7) Technology development (signal and electricity) in Iraq enables me to join e-learning	
Negative perceptions	(1) I bear the burden of expenses on internet data due to online classes	69.43
	(2) Cheating is commonly found in the implementation of e-learning	
	(3) With the existence of online education, the pandemic disrupt my future plan and career	

Source. Authors' calculations based on a Google Forms questionnaire.

TABLE 6: Principle component analysis for challenges.

Components	Statement retained	% Of variance explained
Students' distraction and inefficiency	(1) I confronted online distractions such as social media during virtual classes	34.41
	(2) I experience an emotional disconnect or isolation during virtual classes	
	(3) I am unable to manage my thoughts, feelings, and behaviors during virtual classes	
	(4) Lack of experience in using online tools	
	(5) Low motivation for study in online classes	
	(6) Lack of Interaction with teachers in virtual classes	
Technical and infrastructure issues	(1) Lack of ICT infrastructure like computers, smartphones, internet affecting my participation in online classes	64.84
	(2) The paucity of electricity is always a hurdle to absent me in online classes	
	(3) I'm having problems completing my assignments because of technical issues	

Source. Authors' calculations based on a Google Forms questionnaire.

increased by 7.706. The bulk of academic research from different parts of America indicates that parents' educational levels have a significant impact on their children's access to educational and economic possibilities [37]. Since the majority of the respondents' mothers were uneducated and their fathers worked tiny private and govt jobs, the beta coefficient for the mother's education and father's occupation is negative, which lowers the chance of taking online classes. A value of Exp. (B) for the family income is more than one, showing that the odds of attending virtual classes rose by 4.345 for one unit rise in annual family income. One study from China revealed that children's educational attainment is significantly influenced by family income, and their educational achievement will increase as their household income rises [38].

##### 5.5. PCA and Reliability Analysis of Perceptions and Challenges.

In this section, the researchers enquired regarding the perspective of respondent students toward virtual classes as well as the challenges faced by them. PCA with varimax rotation was performed for perception and obstacles, respectively. It is essentially a data reduction approach that was used to reduce the number of variables that explain less about relevant factors [35]. The Kaiser–Meyer–Olkin test ( $KMO = 0.813$ ) (used to evaluate sample adequacy) value higher than 0.7 indicates

that data was adequate, and Bartlett's test of sphericity ( $\chi^2$  value = 3,438.629,  $p < 0.05$ ) revealed that intercorrelation within components which was acceptable for PCA. According to the results, two components have an Eigenvalue larger than one, implying two-component solutions. Seven of the twelve components expressed positive perceptions of students, whereas three indicated negative perceptions of students toward online classes. According to Table 5, the first component, a positive perception, represented 48.52% of the variation, while the second component, a negative perception, described 69.43% of the variance. We then excluded those factors having a communality value of less than 0.5. Twelve statements about students' perceptions of virtual classes were initially asked by the researcher; however, two items with communality values of less than 0.05 were eliminated.

Additionally, PCA has also been used to address the challenges and difficulties that students have when studying online. The result indicated that two factors have eigenvalue greater than one reflecting two-component solutions. There were 10 statements in all; 6 of the 10 factors demonstrated students' distraction and inefficiency, and three of them related to technical and infrastructure issues. As seen in Table 6, the first component, students' inefficiency, and distraction described 34.41% of the variance, while the second

TABLE 7: Analysis of reliability for challenges and perception.

Variables	Initial number of variables	Number of variables retained	Cronbach's $\alpha$
Perceptions	12	10	0.765
Challenges	10	9	0.747

Source. Authors' calculations based on a Google Forms questionnaire.

TABLE 8: Students' positive perception of virtual classes.

S. no	Statements	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
1	The computer-mediated-system is used to enrich the quality of the student learning experience	16.8%	19.5%	36.3%	8.9%	17.3%	37.4%	54.7%
2	The tasks and activities that teachers provide during online classes help to understand the course material better	32.2%	20.1%	52.3%	5.4%	10.8%	31.4%	42.2%
3	The virtual classes are constructive for your study	21.4%	19.8%	41.2%	6%	14.1%	38.8%	52.9%
4	Online learning is minimized travel expenses and upgrades skills	21.4%	19%	40.4%	11.7%	15.4%	32.5%	47.9%
5	E-learning allows me to learn anywhere at any time	23%	19.2%	42.2%	8.9%	15.7%	33.1%	48.8%
6	I feel that my background and experience will facilitate me to involve more in online studies	23.8%	23.6%	47.4%	7.3%	15.2%	30.1%	45.3%
7	Technology development (signal and electricity) in Iraq enables me to join e-learning	20.9%	23.6%	44.5%	7%	16.3%	32.2%	48.5%

Source. Authors' calculations based on a Google Forms questionnaire.

component, technical and infrastructure problems, expressed 64.84% of the total variance. One item whose communality value was less than 0.5 was deleted.

Following PCA analysis, reliability analysis (Cronbach's coefficient  $\alpha$ ) is carried out to assess the reliability of several selected items. When the Cronbach's  $\alpha$  reliability value is between 0.41 and 0.70, the scale being measured is moderately reliable, and when it is larger than 0.70, the scale being measured is highly internally consistent in the questionnaire [39]. As per Table 7, each of the selected items has a Cronbach's  $\alpha$  value greater than 0.7, which indicates high internal consistency and dependable responses that allowed for additional analysis.

*5.6. Further Analysis of Students' Negative and Positive Perception of Virtual Classes.* Due to the COVID-19 epidemic, the educational system suddenly switched toward extensive distance learning. Therefore, it is important to understand the perception of online learning for students enrolled in various academic schools in Iraq because it is time to carefully reevaluate, modernize, and redesign our educational system, which is urgently needed considering the present situation and the possibility that e-learning may become mainstream in the years ahead. To gauge the student's perception toward online classes, statements mentioned in Table 8 are asked on a five-point Likert ranging from "Strongly Disagree" to "Strongly Agree." Strongly Agree" and "Agree" are merged to generate one positive

response of "Agree". A similar process is used to aggregate the responses "Strongly Disagree" and "Disagree," generating the result "Disagree" from the sample respondents. "Neutral" has been left alone.

#### *5.6.1. Positive Perception of Students toward Virtual Classes.*

The analysis of Table 8 reveals that the response rate for "The Computer-mediated-system is used to enrich the quality of the student learning experience" was the highest at 54.7%, whereas 52.3% of respondents opined that tasks and activities that the teachers provide during online classes did not help to understand the course material better. The second highest response rate (52.9%) was with regard to "virtual classes are constructive for your study" because it was the only viable option available amid of the pandemic. According to the findings of one research, the implementation of virtual classes in Turkey during the COVID-19 pandemic was successful in fostering student engagement and facilitating learning [40]. A total of 48.8% of students opined that e-learning is flexible as they allow them to learn anywhere and anytime. Flexible learning can be defined as a style of learning in which teaching and learning are not focused on a particular location, time, or pace [30]. The factor received a favorable response rate on "Online learning is minimized travel expenses and upgraded skills" is 47.9%, while 44.5% of respondents revealed that technology development (signal and electricity) in Iraq is unable to join e-learning. However, 47.4% of students felt that their background and experience



TABLE 9: Students' negative perception of virtual classes.

S. no	Statements	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
1	I bear the burden of expenses on internet data due to online classes	24.4%	17.6%	42%	8.4%	16.3%	33.3%	49.6%
2	Cheating is commonly found in the implementation of e-learning	21.4%	22.5%	43.9%	7.6%	15.2%	33.3%	48.5%
3	With the existence of online education, the pandemic disrupts my future plan and career	21.7%	22%	43.7%	8.4%	14.6%	33.3%	47.9%

Source. Authors' calculations based on a Google Forms questionnaire.

TABLE 10: Combined mean of perception of students.

Descriptive statistics	N	Minimum	Maximum	Mean	Std. deviation
Positive perception	369	1	5	3.15	0.503
Negative perception	369	1	5	3.16	0.789
Valid (N) listwise					

Source. Authors' calculations based on a Google Forms questionnaire.

will not facilitate them to involve more in online studies due to the low socioeconomic status of their family.

#### 5.6.2. Negative Perception of Students toward Virtual Classes.

Table 9 presents the findings of the analysis of students' negative perceptions of virtual learning. The majority of students (49.6%) said that due to virtual classes, they have to bear the burden of expenses on internet data. Similarly, the exorbitant expense of data plans, which are necessary for virtual classes, adds to the financial hardship on both the parents and students in Bangladesh [41]. The second highest response rate was (48.5%) as students opined cheating is commonly found in the implementation of e-learning because of a lack of understanding in virtual classes; learners want high grades, and they faced several technical glitches and exam stress and anxiety due to COVID-19 pandemic. Correspondingly, a study found in Turkish that according to the opinions of 50% of the participants, cheating is more common and simple in online classes, and students take full advantage of this [42]. A total of 47.9% of students opined that due to the existence of online education, the pandemic disrupted their future plans and careers. As per the World Bank [43] report, the Average future earning loss of students due to the COVID-19 pandemic after entering the workforce in South Asia may be around USD 4,400 in their lifetime wages or 5% of total earnings.

5.6.3. Combined Mean of Pupils' Positive and Negative Perceptions. Table 10 displays descriptive statistics on the positive and negative perceptions of students of virtual classes that were merged. The mean score for students' negative perceptions of virtual classes is 3.16, which is somewhere equal to the mean score of 3.15 for their positive perceptions. Therefore, on average students have mixed opinions toward virtual classes during the COVID-19 pandemic because online classes became a link to address the academic gap caused by the closure of schools and helped them continue to thrive academically despite the prolonged COVID-19 outbreak. On the other hand, a dearth of connectivity, unequal

TABLE 11:  $\chi^2$  analysis of negative and positive perspectives about online classes within gender.

Perceptions	$\chi^2$	p Value
Positive perception	21.95	0.287
Negative perception	13.53	0.260

Source. Authors' calculations based on a Google Forms questionnaire.

access to uninterrupted internet, and lack of adequate instruments for learner assessment create a hassle for students in online learning. A similar type of result was found in Jordan, as e-learning is beneficial during the pandemic, according to faculty and pupils. However, it is less efficient than face-to-face learning and teaching [44].

5.6.4.  $\chi^2$  Test. A  $\chi^2$  test was used to examine the correlation between male and female pupils' opinions of virtual learning from both positive and negative perspectives. As demonstrated in Table 11, the relationship between positive perception within gender was not statistically significant, as determined by the estimated  $\chi^2$  value (1,  $N=369$ ) = 21.95 and  $p$ -value larger than 0.05. Similarly,  $\chi^2$  analysis of negative perception within gender showed a value of  $\chi^2$  (1,  $N=369$ ) = 13.533 and a  $p$ -value higher than 0.05, indicating no statistically significant association between gender and negative perception. Therefore, there was no significant difference between male and female respondents' negative and positive attitudes toward virtual learning.

5.7. Major Difficulties and Problems Faced by Learners in Virtual Classes. While e-learning has appeared as the ultimate savior amid educational institution closures, it has also brought with it its own difficulties [33]. Table 12 outlines the main difficulties pupils had while engaged in online learning amid the COVID-19 epidemic. The biggest issue mentioned by 52.3% of respondents was low motivation to study in online classes because of several distractions in the house as respondent belongs to large family size. Students in the Philippines also reported that the most difficult obstacle they

TABLE 12: Difficulties and challenges confronted by students in virtual classes.

S. no	Statements	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
1	I confronted online distractions such as social media during virtual classes	21.7%	18.7%	40.4%	8.7%	14.1%	36.9%	51%
2	I experienced an emotional disconnect or isolation during virtual classes	17.9%	23%	40.9%	11.1%	13.6%	34.4%	48%
3	I am unable to manage my thoughts, feelings, and behaviors during virtual classes	19.8%	20.1%	39.9%	10.8%	16.8%	32.5%	49.3%
4	Lack of experience in using online tools	21.4%	23.3%	44.7%	8.1%	14.4%	32.8%	47.2%
5	Low motivation for study in online classes	15.2%	23.8%	39%	8.7%	19.5%	32.8%	52.3%
6	Lack of interaction with teachers in virtual classes	20.9%	22.8%	43.7%	10.6%	17.1%	28.7%	45.8%
7	Lack of ICT infrastructure like computers, smartphones, internet affecting my participation in online classes	17.1%	25.2%	42.3%	11.9%	16.5%	29.3%	45.8%
8	The paucity of electricity is always a hurdle to absence me in online classes	27.9%	19%	46.9%	4.9%	14.9%	33.3%	48.2
9	I'm having problems completing my assignments because of technical issues	19.8%	23.3%	43.1%	10.3%	14.1%	32.5%	46.6%

Source. Authors' calculations based on a Google Forms questionnaire.

TABLE 13: Students' opinions toward teachers in virtual classes.

S. No	Statements	SD (1)	D (2)	Total (1 + 2)	N (3)	A (4)	SA (5)	Total (4 + 5)
1	Teachers did transmit instructions better in online classes than in offline classes	18.2%	28.7%	46.9%	10.8%	17.3%	24.9%	42.2%
2	Teachers verify whether we have understood the lessons by seeking feedback or encouraging us to ask more questions	15.4%	24.1%	39.5%	16.8%	18.2%	25.5%	43.4%
3	I can ask any questions to my teacher and receive a quick response during online classes	15.7%	22%	37.7%	12.2%	22%	28.2%	50.2%
4	The teacher is more satisfied with modern platforms and has a positive attitude toward e-learning	20.3%	27.4%	47.7%	8.7%	14.1%	29.5%	43.6%
5	Schools and government have expressed willingness to help students with the provision of equipment needed for participation in e-learning	13.8%	42.3%	56.1%	9.8%	19.5%	14.6%	34.1%

Source. Authors' calculations based on a Google Forms questionnaire.

faced during e-learning was distractions at home, difficulties in completing the requirements for certain subjects, and troubles in choosing the learning areas and study schedule [45]. The second highest challenge faced by 51% of students with regard to online distraction in virtual classes as several students carry their smartphones in their hands when they study, opening new tabs to watch entertaining videos or browse social media [46]. A total of 49.3% of students confronted the issue of managing their thoughts, feelings, and behaviors, whereas 48% of students experienced an emotional disconnect or isolation during virtual classes. Due to the absence of group work, communication breakdowns, and limitations on outside activities in virtual classes, students often feel socially isolated [47]. Around 48.2% of students

expressed that the paucity of electricity and 47.2% of respondents faced a lack of experience in using online tools creating a hurdle to taking online classes. In addition, 46% of students having problems while completing their assignments because of technical issues, while 45.8% of students' major concern was lack of interaction with teachers and ICT infrastructure like computers, smartphones, and Internet affecting their participation in online classes.

*5.8. Students' Perception of Teachers during Online Classes.* Table 13 depicts students' perception of teachers in online learning during an ongoing pandemic. We can see from Table 13 that a total of 46.9% of students told that teachers did not transmit instruction better in online classes, whereas

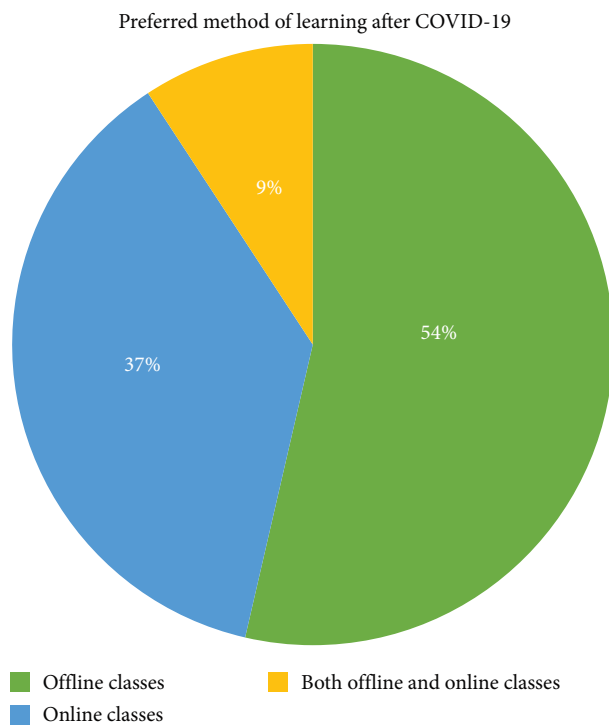


FIGURE 2: Preferred method of learning post-outbreak. *Source.* Authors' calculations based on a Google Forms questionnaire.

43.4% of respondents agreed that teachers verified whether we understood the lessons by seeking feedback or encouraging us to ask more questions. However, the majority of students (48%) disagreed about this factor "Teacher is more satisfied with modern platforms and has a positive attitude toward e-learning." Teachers were reluctant to explain and define themselves in virtual classes due to poor equipment at home, and they were not tech-savvy in India [31]. More than half of students (56%) opined that schools and the government have not expressed willingness to help students with the provision of equipment needed for participation in e-learning in Iraq.

**5.9. Preferred Method of Learning after COVID-19 and Gender Digital Divide.** The COVID-19 epidemic has caused a drastic transformation in the educational sector, not just in Iraq but all around the globe. The researchers surveyed the students to determine their preferred way of learning post-COVID-19 outbreak. The result revealed that most Iraqi school students (53.4%) did not prefer online classes over face-to-face classes after this pandemic. As indicated in Figure 2, 37% of the students chose virtual classes over normal classes as the best alternative for their prospective learning, while 9.2% of students opined that they preferred a combination of both virtual and normal classes for their education post-crisis. The further study tried to investigate the gender digital divide in Iraq during the ongoing pandemic by asking about "Boys could have greater access to personal phones and Internet connectivity for online classes, as compared to girls." The result shows that the majority of the students (54%) agreed that boys have more access than girls to mobile phones and Internet connectivity for online

classes whereas 39% of learners disagreed with the statement related to the gender digital divide. And 7.6% of students kept neutral about it. Similar results were found in India; 37% of boys stated they could access their cell phones at home whenever they wanted, while only 26% of girls said the same [48]. Another research indicated that the percentage of males who have mobile phones is 1.5 times higher than that of girls [49]. In African countries, gender variations were predominantly owing to the gender digital divide as boys have larger access to personal phones and internet connectivity, whereas girls are informed of confined connectivity because of conservative gender norms [50]. According to one study in Pakistan, parents were allegedly unwilling to provide their girl's smartphones and, when they did, continuously monitored their activities to safeguard and regulate them, while boys were not subject to any such restrictions [48]. On the other hand, some other factors hamper girls' involvement in digital remote learning in many contexts due to a dearth of digital skills, confined access to devices that are capable of accessing the internet, and cultural, financial, and logistical barriers that increased restrictions and monitoring on the use of devices by girls as compared to boys [49].

## 6. Conclusions

In the light of the current COVID-19 outbreak, this research evaluated school children's attitudes toward virtual learning and the difficulties they encountered. Our study indicates that pupils at all types of schools, including governmental and nongovernmental ones, have a mixed perception of online classes since the combined mean of positive and negative opinions about this new teaching strategy for students is equal. Similar findings were found for university students in Karnataka, India, who have mixed perspectives about pursuing virtual learning [51]. In contrast, Delhi's school learners and Saudi Arabian universities' students have a positive opinion of online classes to sustain their academic progress throughout the COVID-19 pandemic, and the employment skills of university students are greatly benefiting from the widespread adoption of e-learning [29, 52, 53]. The findings of the present study showed that there was no noticeable difference in the positive and negative opinions of respondents regarding online learning, whether they were male or female. Nevertheless, there were challenges and difficulties that pupils had to deal with in online classrooms, such as low levels of motivation for study, digital temptation, the need to control one's thoughts, feelings, and actions, emotional disconnection, or isolation, etc. Similarly, one research indicated that students' concerns about the fairness, validity, and safety of e-exams that were conducted during the pandemic [54].

After the epidemic, most Iraqi pupils did not favor online classes over face-to-face classes, and some of the respondents chose a hybrid method for their education that included both traditional and online classes. More than 50% of respondents felt that the gender digital divide in Iraq is reflected in the fact that boys have greater access than girls to mobile phones and Internet connectivity for virtual learning. Additionally,

the study showed that less than half of students felt that teachers did not effectively convey information in online classes because it is challenging for teachers to monitor each student's academic growth in the same way as they did under the traditional teaching system [55]. And neither the government nor the school system had expressed a desire to assist learners in providing the necessary tools for participating in e-learning in Iraq.

## 7. Policy Implications

Therefore, the outcomes of this research would convince academic organizations and policymakers for upgrading the effectiveness of online learning with the most up-to-date methods of instruction together with the government's support for advancing remote regions and fostering basic infrastructure, Internet access, bridging the digital divide, and making e-learning more fruitful and generally acknowledged across Iraq. Moreover, it should also be acknowledged that educators need to have sufficient technology training to conduct online classes since this training is a requirement for the successful implementation and delivery of virtual learning. Consequently, this multitude of variables ought to be considered while fostering a web-based course to make it more viable and useful for the students. It is probable that after the COVID-19 outbreak passes, educational institutions will keep using digital tools as learning assistance, but in a hybrid manner in addition to normal classrooms. As a result, this research will be valuable for reconsidering and rebuilding the school curriculum to include elements that employ the online method.

## Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

## Additional Points

*Limitation of the Study and Future Scope.* This study was limited to only the Kurdistan region of Iraqi secondary school students by utilizing a minimum number of variables and methods due to time constraints. It was only based on a quantitative research method. For the sake of brevity, we further constrained our research to examine students' perceptions while excluding teachers' perceptions toward online classes. In terms of the scope of future investigation in this area, an identical type of study can be repeated subsequently, and results can be extended to several regions or countries. Therefore, a more thorough study will be required in the future, including qualitative or mixed-methods research. Additional studies can investigate teachers' perspectives as well as learners' and parents' opinions toward e-learning.

## Consent

Informed consent was obtained from the respondents of the survey.

## Conflicts of Interest

The authors declare that they have no conflicts of interest.

## Authors' Contributions

All of the authors contributed to the conceptualization, formal analysis, investigation, methodology, and writing and editing of the original draft.

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