

The 17th International Scientific Conference
eLearning and Software for Education
Bucharest, April 22-23, 2021
DOI: 10.12753/2066-026X-21-001

**INVESTIGATING DIGITAL EQUITY IN DISTANCE EDUCATION IN SAUDI
ARABIA DURING THE COVID-19 PANDEMIC**

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Abstract: Due to the COVID -19 Pandemic, there was a sudden shift from face-to-face to distance education in all schools and universities in Saudi Arabia (SA) starting March 2020. Many instructors and students were not technically prepared for this abrupt transition as some did not have devices and Internet access. On the other hand, some households have high-speed Internet and even a device for each child. This study investigates the digital equity in accessing online courses by students in low-income families, orphanages, and remote areas. A sample of school and university teachers and students from different regions in SA was interviewed. The subjects reported that lack of devices/Internet access was overcome by: (i) Governorates donating thousands of tablets to disadvantaged students; (ii) charity organizations and affluent individuals donate tablets/laptops and financial aid; (iii) some school teachers collect money to buy tablets for needy students; (iv) students who do not have devices and/or Internet go to school few times a week and meet with teachers face-to-face to teach them and help them with homework; (v) needy college students are allowed to use devices and Internet at their college computer labs or library; (vi) some underprivileged students reported borrowing a smart phone/laptop from relatives or neighbours and/or use relatives and neighbours' Internet; (vii) Saudi mobile companies offer special Internet packages for students and teachers. Sample regions, types of disadvantaged students and help provided to bridge the digital and distance education gap in SA during COVID -19 are given in detail.

Keywords: COVID-19, distance learning, digital equity, digital divide, bridging digital divide, lack of devices, lack of Internet connectivity, low-income families, underprivileged students.

I. INTRODUCTION

Due to the COVID-19 Pandemic, there was a sudden shift from face-to-face to distance education in all schools and universities all over the world. The decision to close schools and universities resulted in significant vulnerabilities in the educational systems. The most important challenge/barrier to providing distance education has been the limited access to technology and Internet services especially in developing countries, remote and rural areas, low-income families, minorities, disadvantaged students, students with disabilities, and students of color who cannot afford the hardware, software, and access to the Internet that facilitate distance learning from home. This digital divide problem, i.e., disparities in access to technology, is a global phenomenon. Access to digital technologies is crucial for enabling students' participation and engagement in distance learning from home.

The digital divide problem in distance education during school closure due to the COVID-19 Pandemic has been the focus of numerous studies in the literature. For example, in the USA, [1] revealed systemic inequities that affect online education from home during the pandemic namely disparities in access, availability of devices, and technological skills. Almost 1 in 5 charter school students are in an area with low access to the Internet [2]. Low-income Latino children living in a Mobile Park in the Silicon Valley are facing significant barriers to adequate access to technology at home because of socioeconomic barriers [3]. 53% of Americans believe that Americans with lower incomes are having

concerns about the digital divide and the digital "homework gap" in distance education during the pandemic. They are worried about paying their broadband Internet and mobile phone bills. They mostly believe that K-12 schools should provide computers to at least some students during the pandemic [4].

In addition, there are disparities in Internet access for households with higher levels of poverty in rural areas. Students in high-poverty schools lack Internet access from home. Only 30% of the students in high-poverty schools have access to the Internet from home, compared with 83% of the students in low-poverty schools. Lack of Internet or appropriate devices at home seem to influence students' engagement in distance learning and instructors' communication with parents and students during school closure in pandemic [5].

A report by the Center on Reinventing Public Education in the USA which reviewed COVID-19 response plans of 477 school districts across the USA, [6] reported that some school districts have made some extraordinary efforts to overcome the digital divide and deliver online instruction from home. However, most students, especially those in small school districts and rural areas and, are lagging behind where they should be their educational process next year. There is also an education gap between rural and more urbanized communities. Many rural areas lack adequate broadband Internet access [7]. In addition, Black, Indigenous, and other people of color in rural communities have been marginalized over many generations and this has created wide inequities in digital access, compounding a continued lack of investment in these communities. Similarly, culturally, and linguistically diverse students and their families suffer from the digital divide and unequal access to technology due to emergency online learning [8].

In a study of levels of technological access (ownership, access to, usage of computer devices and access to Internet services) and levels of technology-related skills as they pertain to 535 underserved and underrepresented students at a public Midwestern university, [9] found that first generation, low income, non-white, academically at-risk, academically underprepared, and under-credited students have significantly lower levels of technological access. About half of the students use smartphones to access online courses.

In other countries like Australia, there are challenges facing culturally and linguistically diverse migrant and/or refugee students during the COVID-19 Pandemic relating to cultural and linguistic diversity, financial disadvantage, mental health, unfamiliarity with educational systems and interrupted education that affect their distance education [10]. In Turkey, teachers and students reported infrastructure problems and lack of equipment that hinder distance education carried out during the COVID-19 Pandemic [11]. In Pakistan, [12] asserted that online learning cannot produce the desired outcomes in underdeveloped countries like Pakistan, where the vast majority of students are unable to access the Internet due to technical and financial issues.

In Saudi Arabia (SA), when school closure began in March 2020, 6,187,776 students in grades K-12¹, and 1,982,747² students in higher education institutions had to begin their online learning from home. Many instructors and students in schools and universities were not technically prepared for the abrupt transition. Some students were at a disadvantage because they lacked access to technology, vis devices, Internet services or both. Even those who had access to technology had technical problems with the distance learning platforms and had Internet connectivity issues such as slow browsing as 8 million students went online at the same time which was unprecedented [13].

Since this is the 3rd semester of distance education from home at Saudi schools and universities, this study aims to explore the issue of digital equity in accessing online courses by mainstream and disadvantaged students in grade k-12 and higher education institutions; the types of disadvantaged students who have no or inadequate access to distance education during the pandemic; how digital inequity is being resolved; how disadvantages students who lack access to technology and/or Internet services study from home during the pandemic; whether there is a difference between male and female students in digital access; and the role of teachers, principals, university administrators, Ministry of Education, companies and banks, charity organization and individual people in the community in facing the digital gap and helping disadvantaged students pursue their education from home to prevent learning loss and achieve learning outcomes.

¹ <https://departments.moe.gov.sa/InvestorsRelations/statistics/Pages/default.aspx>

² <https://mhtwyat.com/how-many-students-are-in-saudi-arabia/#i>

Results will be based on interviews with a sample of teachers and students from different regions in SA and representing different social groups. Results will be reported quantitatively and qualitatively.

This study is significant because continuing distance learning and teaching during the pandemic impacts disadvantaged students' participation in online courses. In this respect, [14] revealed a positive impact on academic achievement for disadvantaged students who could afford ubiquitous access to technology (devices and Internet) at home. The current study is also timely because adequate access to technology is critical for benefitting from distance learning especially by disadvantaged students. The study findings can be used to guide and inform subsequent actions vital to bridging the digital inequity gap. Furthermore, this study fills a gap in distance education research during the COVID-19 Pandemic, especially research related to digital inequity in SA and how this issue is being combatted. It explores how students from low-income families across socio-economic spaces are continuing their education from home with and without technological access. It sheds light on the adaptations and provisions that are being made in SA to bridge digital inequity among students of all levels and sheds light on more practical and affordable ways of enabling and improving access to distance learning by different groups of disadvantaged students in different regions. It will help teachers, school principals, university administrators, and stakeholders discern the different ways for helping disadvantaged students.

Finally, findings of the presents study are significant for the UNESCO-led Global Coalition for Education initiative, which is seeking solutions to support students, teachers, and governments worldwide in education during the pandemic, with a main focus on inclusion, digital equity, and gender equality. Solutions for bridging the digital gap presented in the present study will be beneficial for other countries and will give examples of how education during a crisis can be managed, and how digital equity can be achieved. Results will provide teachers and higher education institutions with new solutions to implement effective student-centered and technology-enabled learning models.

II. METHODOLOGY

2.1 Samples

Subjects of the current study consisted of 103 teachers, students, and parents (12% male vs 88% female). The subjects included K-12 grade schoolteachers at public and private schools (32%), college faculty at state and private universities (24%), high school and college students (20%), housewives (8%), individuals with private businesses (6%), non-Saudi (expatriate) workers (6%), individuals working at an orphanage and other charities (4%). The subjects were selected from different regions in SA: Riyadh (46%), Jeddah (26%), Mecca (12%), Eastern Province (4%), Southern Province (4%), Tabuk (2%), Dhiba (2%), Taif (2%), and Abha (2%).

2.2 Data Collection and Analysis

A questionnaire-survey with open ended questions was sent to the participants via WhatsApp, Telegram and Facebook Messenger. The questions asked the participants about students' access to technology (devices and Internet) during the COVID-19 Pandemic, particularly how disadvantaged students who do not have any devices and/or Internet access in schools and universities are studying during the school closure, doing homework, taking their tests and going on with their education; and the role of teachers, principals, university administrators, Ministry of Education, government officials, companies and banks in the private sector, charity organization and affluent people in the community in addressing individual students' needs and helping disadvantaged students pursue their education from home. They were also asked about digital access to online courses in families with 6 or more children. The subjects were asked to give examples of students who have no access to technology (devices and Internet), where they are located and why they have no access to technology.

In addition, the author collected data and statistics related to the issues investigated in this study from Twitter such as the Saudi Ministry of Education's Twitter account, newspaper reports, news websites, websites of charity societies, companies and banks reported in the study.

Responses to the questionnaire-survey were compiled, categorized according to the questions, and then quantified. Percentages of participants giving the same response were calculated. Responses are also reported qualitatively. Where necessary, quotations of some participants' responses are given.

III. RESULTS

Based on the subjects' responses to the questionnaire-survey, access to distance education during the COVID-19 Pandemic was classified according to the following categories:

3.1 Advantaged Students

Advantaged students are those who own a device such as a laptop computer, tablet, iPad, and/or smart phone and in the case of several children in the family, each child has his/her own device in addition to access to high-speed Internet at home. The participants reported that all male and female students in private schools and universities have their own devices such as a laptop computer, iPad/tablet and/or a smart phone and they have access to high-speed Internet, in some cases, using fibre optics.

As for public schools and state universities, the majority of male and female students have their own devices and Internet connection at home. Some subjected wrote:

- Abdullah (TU) from Taif University: *Fewer than 10% of the students do not own a device and/or Internet connection at home.*
- Abeer (TU): *I teach English to female freshman students at King Saud University. All the students are middle-class and can access my online classes from home since the outbreak of the pandemic. 64% access the course form a laptop, 27% access it from a tablet and 9% access it from their mobile. They all have a smart phone.*
- Badriya (TS): *My high school is for girls only and it has 508 students and only 35 students (7%) did not have devices and Internet access at home to attend their online classes during the pandemic. Those 35 students were given devices from Takaful Charitable Foundation.*
- Eman (TS): *My elementary school is coeducational. It has 523 male and female students. Only 25 students (5%) did not have devices and Wi Fi at home to access the platform. The Governorate and a philanthropist provided devices for the 25 students.*
- Arwa, a non-working middle-class housewife: *I have 7 children in grade 2 to college (2 girls and 5 boys). The oldest daughter who is sophomore and a son in grade 12 have a laptop and a mobile phone each, a boy in grade 10 has a desktop and a mobile phone, the other 4 are in elementary and junior high school and each has a mobile phone to access Madrasati platform.*

To participate in distance learning, Blackboard is being used by all Saudi universities, in addition to different free platforms such as Zoom, Microsoft Teams, Google Classroom, Google Meet and others. Male and female students in grades 1-12 can access the Ministry of Education's *Madrasati* online platform equally well. They can also watch the *IEN Educational Channel* on T.V., which is owned and sponsored by the Saudi Ministry of Education. Children in kindergarten use a special Virtual School platform (*vschool.sa*), owned and sponsored by the Ministry. They can download its app from the Apple and Google Play Stores to their iPads, tablets or smart phones. Interestingly, some private schools have their own distance learning platforms. For example, Najd Schools, a private K-12 grade school in Riyadh, has its own distance learning platform called "*Education*". Some private kindergartens use Classera.

3.2 Semi-disadvantaged students

Semi-disadvantaged students are those who have insufficient access to devices as in the case of families with many children or students who possess a device but have no Internet access or bad or slow connection to the Internet as in the following cases:

Case 1: *A low-income family who lives in a rural a village 100 kms away from Abha consists of a mother and her 8 children (5 girls and 3 boys). Their old father was unemployed, and he passed away a year ago and the mother is a housewife. The family lives on charity. Two children do not go to school, the other 6 children (who are in elementary, junior, and senior high school) share 2 mobile phones and a laptop donated to them by a lady. A philanthropist gives them a sim card to access the Internet. The children have difficulty coordinating the use of the laptop and mobile phones due to conflict in course schedules on the Madrasati Platform for students in the same stage, the children sometimes miss some classes.*

Case 2: *Male and female orphan students do not have sufficient devices at the orphanage, i.e., a device for each child. They share devices. They also watch classes on EIN Educational Channel on TV; and go to school few hours a week to get further help from their teachers and catch up with homework and the lessons that they missed.*

In addition, this category includes students who have a device but no Internet or weak Internet connectivity. The subjects reported:

- Abdullah (UT): *Students in my village in the south have at least a mobile phone but they have problems accessing the Internet.*
- Sara (UT): *I work at a girls' college 120 kms far from Riyadh. The students there have difficulty accessing the Internet and logging into the platform because the Internet signal is very weak. They go to a mountain or high areas to pick up the cellular signal.*
- Abdul-Aziz (S): *Some students go to their father's workplace to use the Wi Fi, log into the platform and attend their online classes.*
- Sultan (S): *Some students use their neighbours or relative's Wi Fi.*
- A mother relates: *The teacher asked a student why he was absent the day before. "Because I had not Internet access," the student replied. "How could you access your online classes before then?" the teacher asked. "I was using our neighbour's Internet. Their Internet was disconnected yesterday because they did not pay the bill, that is why I could not log in. But today I am able to login and join my online class because our neighbour paid their bill, and the Internet is back." The student answered.*
- Deema (ST) said: *Students come to school and use the school equipment and Wi Fi. Teachers log them into the platform to attend online classes and take the exams.*

3.2 Disadvantaged students

Disadvantaged students are those who cannot access the distance learning platforms because they have no devices and/or Internet access due to family, social, or economic circumstances issues, or geographical location that hinder their distance learning during the pandemic. The participants gave the following examples of disadvantaged students: (i) students from low-income families who cannot afford to buy a tablet or laptop; (ii) students who live in remote areas such as deserts and rural areas and have no Internet or poor Internet connectivity; (iii) students from low-income expatriate (non-Saudi) families; and (iv) orphans living in an orphanage. A description of how each group is continuing their education during the pandemic and school closure is given in the subsections below.

3.4 How the digital divide is being bridged in SA

When school and university closure started in March 2020, and all students in all school and universities shifted to distance education, some students and teachers were complaining of lack of devices, poor connectivity, and problems in the platform [16]. The Ministry of Education, school and university administrators, stakeholders, parents, and others were trying to find solutions to help all students study and not miss out on their online learning. The subjects reported numerous ways for combatting the digital divide in SA, each of which is described below:

- (1) **Governorates** donated thousands of tablets to male and female low-income and underprivileged students in their school districts. For example, The Governor of Riyadh Initiative called "*Study from Home*" made available 58,000 tablets³ for needy students in the Riyadh School District. The Governor of Tabuk distributed 10,000 tablets⁴ to low-income families who cannot afford buying a tablet to their children.
- (2) **The Ministry of Education** in partnership with *Takaful Charitable Foundation* gave away 12,000 tablets to needy male and female students as part of their "*Digital Giving Initiative*", in August 2020, i.e., shortly before the beginning of the Fall Semester 2020.⁵ In addition, the Ministry of Education gave tablets to needy students registered in Social Security⁶ according to certain criteria: the student

³ <https://twitter.com/saudinews50/status/1354148657814241280>

⁴ <https://ajel.sa/35F6Bv/>

⁵ <http://mhtwyat.com/منح-اجهزة-للطلاب-للتعليم-عن-بعد/>

⁶ <https://twitter.com/SaudiNews50/status/1294980964150542337>

should be a Saudi citizen, the father is deceased, belongs to a low income family, having no car, and the student should be in grades 1-12 and goes to a public school. Children of low-income expatriate families are not eligible for getting a device.

(3) Charity organizations: such as:

- *Awon Tech Organization*⁷, which receives used computers, tablets, and mobile phones from donors and philanthropists, fixes them, upgrade them, and donates them to needy male and female students alike.
- *Takaful Charitable Foundation*, which donates money, meals, clothes, and other services to 400,000 needy male and female students. It supports needy students in the Saudi public schools to enable them to pursue their education. They help them through special projects and initiatives in collaboration with the Ministry of Education and other governmental and non-governmental civil organization. They have donated 38,000 tablets through their “*Technology Enabling Initiative*”, and it is planning to donate a total of 250,000 tablets⁸ to needy students in the near future.

(4) Companies and banks such as the SAMBA Bank⁹, donated money to Takaful, and Saudi ARAMCO oil company¹⁰ donated 13,000 tablet computers equipped with free Internet services, and loaded with educational applications to needy students in SA, through a charitable campaign titled “*The Gift of Knowledge*” in collaboration with the Saudi Telecom Company (STC) and Huawei Tech Investment Saudi Arabia Ltd., Takaful Charitable Foundation, DHL, BGB Arab Ltd., and BZ Arab Drilling Ltd., in addition to the charitable initiative of 450 volunteers who helped with the training.

(5) Mobile companies such as the Saudi Telecom Company (STC) offered special reduced Internet rates for students and teachers to be able to access their online courses from home. Similarly, Zain¹¹ Mobile Company offered special Internet packages for students and teachers to allow them to browse the Internet for free.

(6) Affluent individuals donated laptops to some needy students in schools in their neighbourhoods.

- Eman, a schoolteacher in a coeducational elementary school in Tabuk said: *a philanthropist came to school with 2 devices and requested that they be given to any need students as an act of benevolence. We gave them to 2 female students.*
- Jawaher, a housewife in Abha said: *a philanthropist (lady) came to my aunt’s home and gave a laptop to her children.*

(7) Some schoolteachers and school principals collected money to buy tablets for needy students especially those of low-income non-Saudi expatriates. They would also provide needy students with a mobile sim card to enable them to access online courses.

(8) Students’ clubs, Students Funds, Students Affairs at universities provide needy male and female students with mobile devices. But due to their insufficient budgets, a limited number of devices is distributed, and some students remain without any devices. The subjects wrote:

- Dalia (T): *At King Saud University, needy male and female students can apply to the Student Aid Office which buys devices for them, then the students repay for their devices in instalments deducted from the monthly allowance that they get from the university (between 200-250 euros).*
- Ameena (T): *At Dammam University, needy students apply to the Student’s Club which recycles used devices. The devices are given to needy students for free.*
- Ahmed (TU): *At Taif University and King Abdul-Aziz University, needy students can apply to the Deanship of Students’ Affairs which provides them with devices after conducting a case study and brief checking of students’ socio-economic status.*

The high demand for computers, iPads and tablets, and purchase in large amounts resulted in a shortage of devices in the computer market in SA during the pandemic due to the closure and suspension of export-import activities with foreign countries such as China during the pandemic.

⁷ <https://awontech.org.sa>

⁸ <https://www.alriyadh.com/1837910>

⁹ <https://an7a.com/2020/09/12/وزارة-التعليم-تكرم-مجموعة-ساميا-الما/>

¹⁰ <https://www.spa.gov.sa/1284516>

¹¹ <https://sa.zain.com/ar/all-news/news-01-09>

3.5 Underprivileged students who do not have devices nor Internet access at all and could not get any

A small percentage of students have no devices nor Internet access and could not get a device through donations. This category included Saudi and non-Saudi students from low-income families. To help this category get some education, the Saudi Ministry of Education mandated that teachers go to their school few times a week, for few hours, meet with the students face to face, while wearing masks and keeping social distance, teach them, check their homework, and give them their interm and final exams. They also watch EIN Educational Channel on T.V. which gives classes to all grade level.

Some low-income non-Saudi expatriate families such as some Ethiopian, Eritrean, India, Pakistani, Egyptian, Sudanese, and Syrian families, whose children go to Embassy schools, cannot afford paying their children's school fees and cannot afford buying a device, because some parents have not working during the lockdown and even after the lockdown as some businesses closed and works have been dismissed, therefore the children dropped out of school, and they are staying home. The subjects reported:

- Lubna (ST): *Students who do not have mobile devices and/or Internet go to school and teachers go to school few times a week to teach them face-to-face, give them paper handouts and worksheets and help them with homework.*
- Rawan (S): *Students who cannot afford to buy a tablet or laptop, use their parents' smart phone, or borrow a laptop from a relative. They can watch their courses on IEN T.V. Network.*
- Salma (ST): *Some students borrow a mobile phone or laptop from relatives, and neighbours, use relatives and neighbours' Internet, go to some classmate's house and use their computer and Internet facilities to access their online classes.*
- Fatimah (ST): *A number of schools opened a smart classroom for needy students to enable them to access their online classes.*
- Ahad (TU): *At the college level, the university allows needy students who do not own a device or Internet to use the college computer labs and Wi Fi to access the platform and keep up with their class sessions.*
- Budoor (TU): *At Princess Noura University (a women's only university) in Riyadh, students go to the Main Library and use the computer facilities there to access their online courses.*
- Hind (ST): *Some teachers created a Telegram Channel.*
- Layla (ST): *Some teachers and/or classmates record lectures/lessons in audio on a CD's and make print (paper) copies of assignments for their needy students/classmates who cannot attend online courses. The students play the CD on a CD player, which they borrow or buy at a low price.*

IV. DISCUSSION

The types of disadvantaged students reported by subjects in the current study (low income, high-poverty, orphans, non-Saudi expatriate families, families with many children, underserved, and underrepresented) are partially consistent with findings of prior studies such as [3], [4], [12], [5], [8], [9], [10]. Classification of disadvantaged students in SA is based on economic factors only not ethnicity, cultural deprivation or color as those do not exist to SA. Moreover, areas in SA with inadequate or lack of access to technology (remote and rural areas) where disadvantaged students are located are similar to those mentioned in prior studies such as [2], [7], and [6].

Some of the solutions reported by the teachers in the present study to help needy students are consistent with other studies in the literature such as using offline print-based learning [15] and using special platforms established by Ministries of Education and special TV channels for delivering lessons to students in grades K-12. Like the *Madrasati* platform in SA, students in Jordan can access a free educational platform called *Darsak*¹² for grades k-12, which provides students with lessons through video clips, organized and scheduled according to the Jordanian curriculum, provided by distinguished teachers to make it easy for students to continue their learning, and follow their study materials.

¹² <https://darsak.gov.jo>

Numerous Arab countries are televising lessons to students in different grade levels through Sports and National T.V. Channels as in Jordan and Morocco¹³, and *Madrasatuna*¹⁴ YouTube channel in Egypt.

Actions taken by charity organizations, governorates, companies and banks that are donating tablets to needy students in SA are similar to the Crown Prince Foundation in Jordan, which launched a campaign to collect and distribute thousands of "tablets" to students in various regions in Jordan, especially those in remote areas, to ensure that they can easily access remote learning platforms.

Temporary actions taken by some students in remote areas in SA such as going to mountains and high areas to pick up the cellular signal to be able to join their online classes via their mobile phones are similar to those taken by Indonesian students in rural areas who suffer the most in distance education as they lack Internet access, smartphones as well as expensive laptops. To catch a cellular signal strong enough to complete their homework, some students in Sumatra Island climb tall trees located one mile away from their mountain villages and settle on higher branches¹⁵. Another temporary action taken by some disadvantaged students in the presents study who do not own a device or have no access to the Internet is borrowing a device from relatives and neighbours and/or getting permission to use their Internet. This is also similar to what some Indian students do. Since only 60% of the students at ZP High School in Guntur have access to a smart phone, local elderly people and parents lend their mobile devices to those who do not own a smart phone or internet for few hours to enable them to access their online lessons via WhatsApp and Zoom [16].

Some mobile companies in the present study played a role in facilitating remote learning by providing free Internet access to some students and teachers, others offer Internet packages at a reduced rate. In Kenya, [17] indicated that differentiated costs Internet services targeting specific demographic groups is needed and that use of such a service could help marginalized urban communities access the Internet. He recommended that Internet service providers offer special Internet packages to low-income households.

Other solutions that have been provided to overcome lack of access to technology in some areas and by some groups of students in other countries were not mentioned by subjects in the present study and are not currently provided in SA, vis utilization of mobile digital classrooms and broadcasting lessons via satellite. In Jordan, the Ministry of Education¹⁶, in collaboration with the Crown Prince Foundation and KBW for Investment, has established 25 mobile classrooms (caravans) in remote areas that have no electricity or electronic services to help students join distance education platforms during the pandemic. Those mobile digital classrooms are equipped with computers, linked to satellites, and provided with power generators, taking into consideration safety measures such as social distancing to prevent the spread of the coronavirus. In addition, students in those areas were given remedial and enrichment classes in the summer holiday to make up for the classes that they had missed during the pandemic. In New South Wales, in Australia, the Western Institute of Technical and Further Education delivers vocational education and training courses to students in isolated homesteads and remote Aboriginal communities by Interactive Distance eLearning using a satellite-supported two-way broadband voice, one-way video and Internet access. Adults usually access their courses using the equipment provided to their children who are students of a "School of the Air" or through community facilities in remote Aboriginal communities. TAFE NSW is helping them encounter inequities in distance and rural education by decreasing the digital divide and assisting with rural renewal [18].

V. RECOMMENDATIONS AND CONCLUSION

Without access to technology and Internet services, remote and low-income students have no way of joining and engaging in distance learning from home during the COVID-19 Pandemic. Since school closure started back in March 2020 due to the outbreak of the pandemic, governmental and non-private sector agencies in SA have been making considerable efforts to ensure students' access to technology and distance education from home by listening to complaints about infrastructure and access to technology by students all over the country, finding solutions to existing problems, and making

¹³ <https://www.hespress.com/586457-الوزارة-تشرع-في-بث-الدروس-عبر-القنوات-1>

¹⁴ <https://www.youm7.com/story/2020/10/23/5033200-الابتنانية-و-الإعدادية-الطلاب-البيوتوب-لطلاب-الابتدائية-و-الإعدادية>

¹⁵ <https://aawsat.com/home/article/2496301-«التعليم-عن-بعد»-تضرر-أمن-التعليم-عن-بعد>

¹⁶ <https://www.almamlakatv.com/news/38835-وزارة-التربية-تنشئ-25-غرفة-صفية-متنقلة-في-مناطق-حائية>

continual improvements and planning for the upcoming months. Numerous solutions have been adopted to meet students' technological needs in all regions of the country to enable them to continue their education. These were noted in a study by the Organization for Economic Cooperation and Development (OECD), in cooperation with Harvard University, in which SA was compared with 36 countries as to its response to the COVID-19 Pandemic. Results of the OECD showed that SA progressed in 13 out of 16 indicators compared to the other 36 countries. The study also revealed the presence of relative cooperation among teachers and among schools. Although, students in SA are less likely to easily access a computer and a quiet place at home to study, their motivation for learning contributed to overcoming challenges, in addition to support from their families, continued provision of education through alternative means such as television, the Internet and educational packages, with direct follow-up from the government to keep the learning process going on. Furthermore, results revealed that the collaborative nature of the national work has been remarkable due to the participation and collaboration of schools, parents, local communities, and individual citizens for the continuation of education from home though providing digital devices, quality of ICT infrastructure, and schools' ability to integrate digital devices in education [19].

Although stakeholders in SA have done a lot to bridge the digital gap in schools and universities, further improvements and solutions can still be adopted to reach out for students who still do not have access to remote learning in remote areas and poor homesteads such as using an off-line e-learning platform and low-bandwidth online learning and teaching approaches to provide a bridge for digitally unconnected students and educators to help them join distance learning [20]; [21]. Further improvements in Internet access for students in remote areas and providing more students in low-income households with devices are still needed. The Saudi Ministry of Education may provide additional financial aid to schools and universities to improve and maintain the current distance education infrastructure. To reach students in remote areas in the deserts and mountain villages, digital mobile classrooms (caravans) equipped with computers, connected to a satellite and provided with power generators can be established, taking into consideration health safety measures and social distancing. Rescheduling classes on the Madrasati platform for the different grade levels to avoid overlapping class times will enable students in a single household who are sharing one device to attend online classes and not miss any. After school small-group collaboration among students who own and those who do not own devices and/or Internet especially those living in the same neighbourhood is another useful temporary solution.

The solutions to the digital inequity provided by Saudi governmental and non-governmental agencies reported in the current study will give SA an opportunity for stronger international leadership and collaboration, which in turn might lead to a better focus and better solutions to other countries, with regards to digital tools and digital access.

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