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The Digital Divide among Students and Support Initiatives in the Time of Covid-19

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Abstract: This paper investigated the digital divide among students of a state university in the Philippines in relation to its implementation of technology-led flexible learning due to the CoViD-19 pandemic. The study focused on two major factors of the digital gap: location (urban vs rural) and socio-economic (income clusters). Results provided further evidence that geographic location and income affect digital inequality among students. Both aspects have an impact on device ownership, stable internet connection at home, and frequency of access. Prior online learning experience also shows dependency on a student's geographic location. Location groups and the alternative ways to access the internet have a significant relationship where students from urban areas are more likely to spend money for temporary data subscription, go to internet cafes, or use their neighbor's, friends', and relative's Wi-Fi connection. On the other hand, those from rural areas are more likely to utilize free data and free Wi-Fi in public areas or have no other means to connect at all. The students were also categorized based on the context of flexible learning implementation of the university: those with device and with connectivity, with device but no connectivity, no device and no connectivity. For each category, different support initiatives were developed including utilization of school's ICT facilities, funds for internet subscription, and tablet lending. The study emphasized that school administrators and teachers must take digital divide into consideration in crafting instruction, support guidelines, and policies for flexible learning. A follow up study is also recommended to validate the effectiveness of the university's ICT support initiatives presented in this paper.

Keywords: Digital Divide, CoViD-19, ICT, Flexible Learning

1. Introduction

The unprecedented effect of the corona virus disease 2019 or the CoViD-19 pandemic has taken further the utilization of digital technologies in various aspects due to government advisories restricting face-to-face interactions and mass gatherings (Beaunoyer et al., 2020; Guitton, 2020). One of the most affected by this is the education sector where institutions are now forced to implement alternative modes of instruction delivery which significantly involves information communications technologies (ICT). The use of ICT in education is not new as even prior to CoViD-19, most of the schools have been using computer-based and online systems for course enrollment, scholarships facilitation, communication with students, electronic databases or digital libraries, and instruction (Goode, 2010). Indeed, ICT played a significant role as a pedagogical technique in the past decades or so which led to students' improved engagement in the meaningful use of computers and the internet (Sanchez & Aleman, 2011). It also brought enhancements on the quality of education with advanced pedagogical methods, improvement of learning outcomes and reformation for better management of education systems (Sarkar, 2012).

However, the issues of inequality between individuals and socio-economic groups when it comes to their capability to access these technologies remain to be a hindrance for the full utilization of ICT (Buchi et al., 2018; DiMaggio & Hargittai, 2001; Hargittai, 2010). Hence, with the use of ICT in education, not all students are able to experience the benefits of technology in their learning experiences (Goode, 2010). This has important implications for developing countries, like in the Philippines, where students from rural areas believe that they don't have sufficient access to technology at home to be used in education and that their primary venue to access technology is in their school (Talandron-Felipe,

2019). This poses a significant problem in today's situation due to CoViD-19 as face-to-face classes are restricted and students who are allowed in the campus are limited (CHED, 2020; IATF, 2020).

This paper aims to investigate the extent of the digital gap among students from a state university in a developing country in its implementation of a technology-driven flexible learning program and how the institution plans to mitigate it.

2. Digital Divide

The term "digital divide" was first introduced in the 1990's by former Assistant Secretary of Commerce for Telecommunication and Communication in the US to give attention to the gap between those who can afford to own a computer system to take part in the global information network and those who cannot (Boje & Dragulanescu, 2003). It was then formally defined by the Organization for Economic Co-operation and Development (OECD, 2001) as "the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard to both their opportunities to access ICTs and to their use of the Internet for a wide variety of activities". Over the years, multiple definitions of digital divide exist but inequalities can be put into context as emerging from the differences in two aspects: actual access and digital literacy to utilize the technology (Beaunoyer et al., 2020). Studies show that gender, race, socioeconomic status, geographical location, (dis)ability, educational level are associated with disparities in those aspects (Ferro et al., 2011; Hilbert, 2011; Hill et al., 2015; Novo-Corti et al., 2014; Wu et al., 2014). This means that people who belong to these groups are more likely to have no or limited accessibility to technologies and are denied of educational and socioeconomic opportunities (Gatautis, 2015).

Global projects such as the 'One Laptop per Child' and the 'Hole in the Wall' have exemplified initiatives to help increase ICT access for disadvantaged children in Africa and South East Asia (DISE, 2010; Hole in the Wall, 2010; One laptop per child, 2010). These are in conjunction to UNESCO's aim to empower the people through information and media literacy as an essential precondition for equitable access and inclusive knowledge societies (UNESCO, 2010). However, most of these initiatives are limited within the compounds of the institution and despite ICT access at school, individual differences and home access still affect learners' use and skills (Gudmundsdottir, 2010). One example of promoting ICT access at home was made by the Hong Kong Government in 2011 through their five-year "I Learn at Home" program to assist students purchase computers and pay for broadband services at home (Yuen & Park, 2012).

In today's situation, low-income household are expected to suffer more the immediate and long-term economic consequences of the COVID-19 crisis (Fernandes, 2020; Van Lancker & Parolin, 2020; Wang & Tang, 2020). Considering this, purchasing ICT equipment or internet subscription for their children's online classes will unlikely be a priority in the budget of these families unless they sacrifice spending on their essentials like food, water, clothing, and other household expenses (Beaunoyer et al., 2020). Specifically, in a developing country like the Philippines, prior work found a strong correlation between the combined household income and owning a computer system and access to internet (Talandron et al., 2016).

Aside from income, another significant factor affecting individual's access to ICTs is geographic location in developing countries where those living in rural areas are expected to lag behind those from urban areas because of limited telecommunication infrastructure, availability of equipment, and culture (Acılar, 2011; Hindman, 2000; Talandron et al., 2016; Talandron-Felipe, 2019). Even in a developed country, it was found that urban children had better conditions/performances in every aspect of Internet behavior than rural children and in total, 99% of urban children owned a PC at home, while less than two thirds of rural children owned a PC at home (Li & Ranieri, 2013). Another study in the Mid-Atlantic state in the United States showed that high poverty rates are common in rural settings, which has a negative impact technological resources (Kormos, 2018). The report by Federal Communications Commission (2018) showed that within the United States, 31% of rural households still lack access to broadband Internet. These findings support that digital divide because of geographic

disparity also exist in developed nations although possibly not as much as in developing countries (Acılar, 2011).

3. Data Collection

A survey was conducted in a state university in southern Philippines. Students come from the region composed of five provinces with 9 urban cities and 84 rural municipalities. The total number of students of the state university was 13,405 with 9,022 (67%) from urban areas and 4,383 (33%) from rural areas. Sample sizes from both areas were computed with 95% confidence level and 2% margin of error to determine the number of respondents. The computed sample sizes were 1,897 and 1,552 for urban and rural areas respectively for a total of 3,449 respondents. The students to be surveyed for each category, composed of senior high school and freshmen to senior college, were chosen through simple random technique. The survey was conducted during the enrollment period and was done in various ways in order to cater the students who do not have access to the internet at the time. Students were given the options to answer it online, send in their answers through private message using free data, through SMS, or through phone call.

The survey was designed based on the concept of ICT Development Index (IDI), Digital Access Index (DAI) and Digital Opportunity Index (DOI) (Telecommunications Authority of Trinidad and Tobago, 2013). IDI includes questions and answers about access, skills, and usage; DAI includes knowledge, infrastructure, and affordability; and DOI is about opportunity and utilization. This was the simplified version from DiMaggio & Hargittai's (2001) model of internet inequality as a framework to measure the levels of digital divide in five aspects: 1) inequality in owning the appropriate equipment to access the internet; 2) inequality in autonomy of use which means one's ability to control when and where one wants to use the ICT resources; 3) inequality in the availability of support, both technical and non-technical; 4) inequality in the availability of options for the variation of use considering the purpose and activity; and 5) inequality in computer literacy and skills. Considering the concept and framework mentioned, the goal of the survey was to determine the gadget and connectivity capability of the students at home, their prior experience with online learning platforms, and self-assessment of their ability to perform basic computer tasks like word processing, making presentations, and taking quizzes online, and their need for support in navigating an online learning environment.

4. Results and Discussion

4.1 Location-based Digital Divide

A comparison was made between students from urban areas (urban group) and students from rural areas (rural group) in terms of ICT device ownership, frequency of access to the internet, computer literacy, and prior experience with online learning. Table 1 shows the frequency counts or observations for each group in each indicator.

Table 1. *Comparison of various ICT capabilities between Students from Urban and Rural areas*

Categories	Indicators	Urban		Rural	
		Observations	*(% out of 1897)*	*Observations*	*(% out of 1552)*
Device Ownership (can own multiple)	Desktop/Laptop Computer	729	38%	556	36%
	Tablet	31	2%	42	3%
	Smartphone	1725	91%	1398	90%
	No Device	35	2%	39	3%
Stable internet connection at home	With stable internet at home	790	42%	566	36%

	None but willing to spend	717	38%	570	37%
	None and there is no to have	390	21%	416	27%
Frequency of access regardless of where or how	Daily/every other day	1230	65%	914	59%
	Twice a week	359	19%	337	22%
	Once a week	178	9%	162	10%
	Depends on chance/money	130	7%	139	9%
Computer Literacy (Self-assessment)	Can create documents and presentations	1653	87%	1212	78%
	Can make/edit photos/videos	1453	77%	1059	68%
Prior online learning experience	Attended a class or did an activity via social media and/or learning management system?	1061	56%	588	38%
	Submitted assignments online	1295	68%	920	59%
	Taken online quizzes/exams	1588	84%	1086	70%
	Attended online classes through video conference	1084	57%	900	58%
	Engaged in collaborative activities online with classmates	1094	58%	800	52%
	Responded to online forums	1111	59%	792	51%

A chi-square test of independence was performed to examine the relationship between location and the indicators per category. On device ownership, the relationship was significant, X^2 *(3, N*=4555*)* = 7.852, *p*=0.049172. Students from urban areas were more likely to own ICT devices. On internet connection at home, the relationship was also significant, X^2 *(2, N*=3449*)* = 20.3252, *p*<0.0001. Students from urban areas were more likely to have or willing to spend for a stable internet connection at home. On the third category, the relationship was also significant, X^2 *(3, N*=3449*)* = 13.9537, *p*=0.0029. Students from urban areas have more frequent access to the internet than students from rural areas. When it comes to computer literacy (basic word processing, digital presentations, photo and video editing), the relationship with location was not significant, X^2 *(1, N*=5377*)* = 0.0117, *p*=0.9139. This is somewhat expected because these skills are common to be taught in schools, way before CoViD-19, regardless of where the students came from. On the last category, prior online learning experience, the relationship was significant, X^2 *(5, N*=12319*)* = 36.5025, *p*<0.0001. Students from urban areas were more likely to have been previously exposed to online learning experiences.

4.2 Income-based Digital Divide

A comparison was made between students from various income clusters in terms of ICT device ownership, frequency of access to the internet, computer literacy, and prior experience with online learning. It is also important to note that before this analysis was made, the relationship between location groups and income clusters were tested and the result was not significant, X^2 *(3448, N*=3449*)* = 1658.93, *p*=1.00, which means these two factors are independent from each other. The income clusters were based from the Philippine Institute for Development Studies Policy Notes (PIDS, 2018). Table 2 shows the frequency counts or observations for each group in each indicator.

Table 2. *Comparison of various ICT capabilities between Students from different income clusters*

Categories	Indicators	Upper middle - income *1500-2500USD/Month for a family of 5*		Middle middle - income *850-1499USD/Month for a family of 5*		Lower middle - income *430-549USD/Month for a family of 5*		Low income *215-429USD/Month for a family of 5*		Poor *<215USD/ Month for a family of 5*	
		out of 1072		out of 1025		out of 807		out of 273		out of 272	
Device Ownership (can own multiple)	Desktop/Laptop Computer	504	47%	484	47%	210	26 %	40	15 %	44	16 %
	Tablet	30	3%	28	3%	10	1%	4	1%	1	0%
	Smartphone	984	92%	944	92%	728	90 %	233	85 %	229	84 %
	No Device	4	0%	8	1%	24	3%	22	8%	20	7%
Stable internet connection at home	With stable internet at home	670	63%	622	61%	53	7%	8	3%	3	1%
	None but willing to spend	402	38%	403	39%	470	58 %	3	1%	9	3%
	None and there is no to have	0	0%	0	0%	284	35 %	262	96 %	260	96 %
Frequency of access regardless of where or how	Daily/every other day	862	80%	813	79%	345	43 %	69	25 %	54	20 %
	Twice a week	118	11%	125	12%	249	31 %	105	38 %	99	36 %
	Once a week	60	6%	47	5%	109	14 %	52	19 %	72	26 %
	Depends on chance/money	32	3%	40	4%	104	13 %	47	17 %	47	17 %
Computer Literacy (Self-assessment)	Can create documents and presentations	892	83%	863	84%	677	84 %	217	79 %	216	79 %
	Can make/edit photos/videos	804	75%	768	75%	558	69 %	196	72 %	186	68 %
Prior online learning experience	Attended a class or did an activity via social media and/or learning management system?	587	55%	517	50%	361	45 %	87	32 %	97	36 %
	Submitted assignments online	716	67%	697	68%	512	63 %	148	54 %	142	52 %
	Taken online quizzes/exams	875	82%	828	81%	613	76 %	185	68 %	173	64 %
	Attended online classes through video conference	704	66%	656	64%	450	56 %	135	49 %	116	43 %
	Engaged in collaborative activities online with classmates	634	59%	594	58%	420	52 %	133	49 %	113	42 %
	Responded to online forums	646	60%	609	59%	428	53 %	119	44 %	101	37 %

A chi-square test of independence was also performed to examine the relationship between income clusters and the indicators per category. For the first category, the relationship was significant between device ownership and income, X^2 (12, N=4555) = 242.9193, p<0.0001. Another significant relationship with income clusters was having internet connection at home, X^2 (8, N=3449) = 2715.8746, p<0.0001 and frequency of access to the internet, X^2 (12, N=3449) = 795.9385, p<0.0001. However, no significant relationship was found with income clusters on computer literacy and prior online learning experience, X^2 (4, N=5377) = 1.7053, p= 0.7897 and X^2 (20, N=12319) = 14.9957, p= 0.7766, respectively.

4.3 Device and Connectivity Capability

On the question on having a regular and stable internet connection at home, 37% (1,287 out of 3499, composed of 717 from urban, 570 from rural) answered "*None currently, but we are willing/planning to spend for a connection at home*" and 23% (806 out of 3499, composed of 390 from urban and 416 from rural) answered "*None – there is no way for us to have internet connection at home*" for a total of 2,093 (60%). These students were asked if they have an alternative way to connect to the internet. Responses were grouped into five: free data/free Wi-Fi in public areas, temporary subscription through prepaid load, computer shop or internet café, neighbor's/friends'/relative's Wi-Fi, and none (no other way). Table 3 shows the urban-rural comparison on the alternative ways to access the internet since a regular and stable connection is not available at home.

Table 3. *Urban-Rural Comparison on Alternative Ways to Access the Internet if not available at home*

Alternative way to access the Internet	**Urban**		**Rural**	
	(out of 1109)		(out of 986)	
Free Data/Free Wi-Fi in Public Areas	83	7%	124	13%
Temporary Subscription through prepaid load	332	30%	274	28%
Computer Shop/Café	350	32%	294	30%
Neighbor's/Friends'/Relatives' Wi-Fi	340	31%	289	29%
None	2	0.2%	5	1%

The relationship between group classification (urban vs rural) and the alternative way to access the internet was also measured and a significant relationship was found, X^2 (4, N=2093) = 17.0240, p=0.0019. Students from urban areas were more likely to spend for temporary data subscription, go to internet cafes, or use their neighbor's, friends', and relative's Wi-Fi. On the other hand, those from rural areas were more likely to utilize free data and free Wi-Fi in public areas or have no other means to connect at all.

The same was investigated in terms of income clusters. Table 4 shows the comparison on the alternative ways to access the internet since a regular and stable connection is not available at home based on income clusters.

Table 4. *Income-based Comparison on Alternative Ways to Access the Internet if not available at home*

Indicators	**Upper middle-income** *1500-2500USD/Month for a family of 5*	**Middle middle-income** *850-1499USD/Month for a family of 5*	**Lower middle-income** *430-549USD/Month for a family of 5*	**Low-income** *215-429USD/Month for a family of 5*	**Poor** *<215USD/ Month for a family of 5*
	out of 402	out of 403	out of 754	out of 265	out of 269

Free Data/Free Wi-Fi in Public Areas	27	7%	31	8%	72	10 %	39	15%	40	15%
Temporary Subscription through prepaid load	122	30%	116	29 %	233	31 %	65	25%	67	25%
Computer Shop/Café	119	30%	116	29 %	233	31 %	84	32%	92	34%
Neighbor's/ Friends'/Relatives' Wi-Fi	134	33%	140	35 %	214	28 %	73	28%	68	25%
None	0	0%	0	0%	2	0%	4	2%	2	1%

The chi-square test of independence was also used to check the relationship between income clusters and alternative ways to connect to the internet. The result was significant, X^2 *(*16*, N*=2093*)* = 46.0760, p<0.0001. Those from upper middle to lower middle-income tend to spend more on temporary internet subscription through prepaid load while those from low-income and poor tend to utilize more the free data or free Wi-Fi in public places.

4.4 Digital Divide and CoViD-19 Restrictions

As the results show, location-based and income-based digital divide exist among the students and this should be taken into consideration when schools develop policies on flexible learning in this time of crisis. More so, CoViD-19 safety protocols may widen the gap as going out and traveling restrictions are in place (IATF, 2020). Students who need to go to public places or their friends' or relatives' houses to connect to the internet may no longer be allowed to do so. Similarly, income-based digital divide may also worsen as the Philippine economy is continuously declining (Estadilla, 2020). As previously mentioned, low-income households are the ones anticipated to be impacted by the economic consequences of the COVID-19 crisis (Fernandes, 2020; Van Lancker & Parolin, 2020; Wang & Tang, 2020).

Aside from geographic location and income clusters affecting the digital divide among the students, CoViD-19 related restrictions are also making it more difficult for students to find alternative ways to access ICT for their education. The Inter-Agency Task Force in the Philippines restricts those who are below 21 years old to go outside and inter-provincial travels requires quarantine protocols (IATF, 2020). These limitations prevent the university from utilizing its in-campus ICT facilities for students below 21 years old and those living from other provinces who do not have devices and connectivity capability at home. Table 5 shows the matrix developed to classify students based on device and connectivity capability and specific quarantine circumstance and the distribution of the respondents.

Table 5. *Students' device and connectivity capability and quarantine circumstances*

Circumstance ***(Based on Quarantine Protocols)***	**Owns a device and has stable internet access at home**		**Owns a device but has no stable internet access at home**		**No device and has no stable internet access at home**	
21 years old & above and resides within the province ***(may go to school)***	172	(5%)	240	(7%)	1	(0.03 %)
21 years old & above but resides outside the province ***(difficult to travel)***	42	(1%)	175	(5%)	11	(0.3%)

Below 21 years old *(should stay at home)*	11 42	(33%)	160 8	(47%)	58	(2%)
Total	13 56	(39%)	202 3	(59%)	70	(2%)

Students who own a device and has stable internet access at home are considered to be capable of synchronous learning with the assumption that other considerations such as the availability of a study place and other home-related aspects are not a problem. Although flexible learning is a combination of both synchronous and asynchronous activities, efforts to provide ICT support should be prioritized for students who own a device but has no stable internet access at home and those without both device and connectivity.

4.5 Initiatives to Support the Students

Based on the findings, support to students will be classified into two types: connectivity support and both device & connectivity support. It is also important to note that school funds of state universities are limited and affected by the pandemic and this should be taken into consideration. Even though face-to-face classes are restricted (CHED, 2020), school's ICT facilities may still be utilized by students who are 21 years old and above who reside within the province and will not have difficulty to go to the campus. Scheduling and strict safety protocols are to be implemented for this type of support. For those who live outside the province, the university will partner with internet cafes and computer shops as a venue for students who are 21 years old and above and may go out of their homes. For those who are below 21 years old and are strictly advised to stay home (IATF, 2020), the university shall provide support through tablet lending and temporary internet subscription. Table 6 shows a summary of the various types of support depending on device and connectivity capability and specific quarantine protocols.

Table 6. *ICT Support Initiatives*

Circumstance *(Based on Quarantine Protocols)*	**Owns a device but has no stable internet access at home**	**No device and has no stable internet access at home**
21 years old & above and resides within the province *(may go to school)*	*Support for connectivity – may utilize campus Wi-Fi hotspots*	*Support for device and connectivity – may utilize campus computers and Wi-Fi hotspots*
21 years old & above but resides outside the province *(difficult to travel)*	*Support for connectivity – scheduled prepaid load may be provided by the school for internet subscription*	*Support for device and connectivity – the school will provide vouchers so students may utilize nearby internet cafes for computers and stable connection*
Below 21 years old *(should stay at home)*	*Support for connectivity – scheduled prepaid load may be provided by the school for internet subscription*	*Support for device and connectivity – priority for tablet with network sim card or laptop with pocket Wi-Fi lending program*

5. Conclusion and Recommendation

A state university in southern Philippines, a developing country in Asia, conducted a study to investigate the digital divide among its students. The study focused on two major factors of the digital gap: location (urban vs rural) and socio-economic (various income clusters). Results are consistent with findings from prior research that geographic location (Acılar, 2011; Hindman, 2000; Li & Ranieri, 2013; Talandron et al., 2016; Talandron-Felipe, 2019) and income (Ferro et al., 2011; Hilbert, 2011; Hill et al., 2015;

Novo-Corti et al., 2014; Wu et al., 2014) affect digital inequality. Both aspects impacted device ownership, having stable internet connection at home, and frequency of access while prior online learning experience showed dependency on location. A significant relationship was also found between locations groups (urban vs rural) and the alternative way to access the internet where students from urban areas were more likely to spend for temporary data subscription, go to internet cafes, or use their neighbor's, friends', and relative's Wi-Fi. On the other hand, those from rural areas were more likely to utilize free data and free Wi-Fi in public areas or have no other means to connect at all. Then, the students were categorized based on the context of flexible learning implementation of the university: with device and with connectivity, with device but no connectivity, no device and no connectivity. For each category, the university came up with different support initiatives to be provided to the students including utilization of school's ICT facilities, funds for internet subscription, and tablet lending.

This study also contributed to digital divide literature by providing more evidence as to the ICT capability of students in both urban and rural areas from different income clusters to emphasize that digital inequalities exist and could affect the implementation of flexible learning more so of online learning and the conduct of synchronous activities. It is suggested that school administrators take these into consideration in crafting support guidelines and policies. Teachers should also take into account the ICT profile of students in designing tasks especially synchronous activities. A follow up study is also recommended to validate the effectiveness of the ICT support initiatives presented in this paper in relation to the students' flexible learning experience.

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References

Acılar, A. (2011). Exploring the aspects of digital divide in a developing country. Issues in Informing Science and Information Technology, 8, 231–244.

Beaunoyer, E., Dupéré, S., & Guitton, M. J. (2020). COVID-19 and digital inequalities: Reciprocal impacts and mitigation strategies. Computers in Human Behavior, 106424.

Boje, C., & Dragulanescu, N. G. (2003). Digital divide" in Eastern European countries and its social im-pact. Proceedings of the 2003 American Society for Engineering Education Annual Conference & Ex-Position. American Society for Engineering Education Annual Conference. http://soa.asee.org/paper/conference/paper-view.cfm?id=18355

Buchi, M., Festic, N., & Latzer, M. (2018). How social well-being is affected by digital inequalities. International Journal of Communication, 12, 3686–3706. https://doi.org/ 10.5167/uzh-167385

CHED. (2020). Guidelines for the Prevention, Control and Mitigation of the Spread of Coronavirus Disease 2019 (COVID-19) in Higher Education Institutions (HEIs). Commission on Higher Education, Philippines.

DiMaggio, P., & Hargittai, E. (2001). From the "digital divide" to "digital inequality": Studying internet use as penetration increases. Center for Arts and Cultural Policy Studies, Princeton University, 15, 1–23. https://doi.org/10.1002/bem.20484

DISE. (2010). DISE 2009-2010 data collection. National University of Educational Planning and Administration. http://www.dise.in//

Estadilla, L. S. (2020). The Economics of COVID-19 in the Philippines. Eubios Journal of Asian and International Bioethics, 30(9), 178.

Federal Communications Commission. (2018). Broadband Deployment Report. https://www.fcc.gov/reports-research/reports/broadband-progressreports/ 2018-broadband-deployment-report

Fernandes, N. (2020). Economic effects of coronavirus outbreak (COVID-19) on the world economy. https://ssrn.com/abstract¼3557504

Ferro, E., Helbig, N. C., & Gil-Garcia, J. R. (2011). The role of IT literacy in defining digital divide policy needs. Government Information Quarterly, 28(1), 3–10. http://dx.doi.org/10.1016/j.giq.2010.05.007

Gatautis, R. (2015). The impact of ICT on public and private sectors in Lithuania. Engineering Economics, 59(4).

Goode, J. (2010). The digital identity divide: How technology knowledge impacts college students. New Media & Society, 12(3), 497–513.
Gudmundsdottir, G. (2010). From digital divide to digital equity: Learners' ICT competence in four primary schools in Cape Town, South Africa. International Journal of Education and Development Using ICT, 6(2), 84–105.
Guitton, M. J. (2020). Cyberpsychology research and COVID-19. Computers in Human Behavior, 106357. https://doi.org/10.1016/j.chb.2020.106357
Hargittai, E. (2010). Digital Na(t)ives? Variation in internet skills and uses among members of the "net generation. Sociological Inquiry, 80(1), 92–113. https://doi.org/ 10.1111/j.1475-682X.2009.00317.x
Hilbert, M. (2011). Digital gender divide or technologically empowered women in developing countries? A typical case of lies, damned lies, and statistics. Women's Studies International Forum, 34(6), 11. http://dx.doi.org/10.1016/j. wsif.2011.07.001
Hill, R., Betts, L. R., & Gardner, S. E. (2015). Older adults' experiences and perceptions of digital technology: (Dis)empowerment, wellbeing, and inclusion. Computers in Human Behavior, 48, 415–423. http://dx.doi.org/10.1016/j.chb.2015.01. 062
Hindman, D. B. (2000). The rural-urban digital divide. Journalism and Mass Communication Quarterly, 77(3), 549–560.
Hole in the Wall. (2010). Technological innovations. Hiwel. http://www.hole-in-the-wall.com/technological-innovations.html
IATF. (2020). Omnibus Guidelines on the Implementation of Community Quarantine in the Philippines. Inter-Agency Task Force, Philippines.
Kormos, E. M. (2018). The unseen digital divide: Urban, suburban, and rural teacher use and perceptions of web-based classroom technologies. Computers in the Schools, 35(1), 19–31.
Li, Y., & Ranieri, M. (2013). Educational and social correlates of the digital divide for rural and urban children: A study on primary school students in a provincial city of China. Computers & Education, 60(1), 197–209.
Novo-Corti, I., Varela-Candamio, L., & Garcia-Alvarez, M. T. (2014). Breaking the walls of social exclusion of women rural by means of ICTs: The case of 'digital divides' in Galician. Computers in Human Behavior, 30, 497–507. http://dx.doi. org/10.1016/j.chb.2013.06.017
OECD. (2001). Understanding the digital divide. Organisation for Economic Co-operation and Development (OECD). http://www.oecd.org/dataoecd/38/57/1888451.pdf
One laptop per child. (2010). One laptop per child Press release. http://laptop.org/en/utility/press/index.shtml
PIDS. (2018). Defining and profiling the middle class (Philippine Institute for Development Studies Policy Notes). Philippine Institute for Development Studies.
Sanchez, J. J. C., & Aleman, E. C. (2011). Teachers' opinion survey on the use of ICT tools to support attendance-based teaching. Computers & Education, 56(3), 911–915.
Sarkar, S. (2012). The role of information and communication technology (ICT) in higher education for the 21st century. Science, 1(1), 30–41.
Talandron, M. M. P., Tautho, Y. C., & Tautho, C. C. (2016). Investigating the Digital Divide in a Rural Community in the Philippines. Central Mindanao University Journal of Science, 2016.
Talandron-Felipe, M. M. P. (2019). The Role of Technology Identity among Students in Rural Areas using a Web-based Tutoring System. Proceedings of the 27th International Conference on Computers in Education. 27th International Conference on Computers in Education, Taiwan.
Telecommunications Authority of Trinidad and Tobago. (2013). The Digital Divide Survey Trinidad and Tobago. Trinidad and Tobago. https://tatt.org.tt/portals/0/documents/
UNESCO. (2010). Media and Information Literacy. http://portal.unesco.org/ci/en/ev.php
Van Lancker, W., & Parolin, Z. (2020). COVID-19, school closures, and child poverty: A social crisis in the making. The Lancet Public Health, 2019(20), 2019–2020. https:// doi.org/10.1016/s2468-2667(20)30084-0
Wang, Z., & Tang, K. (2020). Combating COVID-19: Health equity matters. Nature Medicine. https://doi.org/10.1038/s41591-020-0823-6
Wu, T. F., Chen, M. C., Yeh, Y. M., Wang, H. P., & Chang, S. C. H. (2014). Is digital divide an issue for students with learning disabilities? Computers in Human Behavior, 39(0), 112–117. http://dx.doi.org/10.1016/j.chb.2014.06.024
Yuen, H. K., & Park, J. H. (2012). The digital divide in Education and students' home use of ICT. Proceedings of the 2nd International Conference on The Future of Education.