

The Impact of the Digital Divide on Higher and University Education Sector Performance

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How to cite this paper: Gulain, M. B., Justin, B. N., & Expédit, S. W. (2022). The Impact of the Digital Divide on Higher and University Education Sector Performance. *Open Journal of Social Sciences*, 10, 22-30. <https://doi.org/10.4236/jss.2022.1010003>

Received: July 26, 2022

Accepted: September 5, 2022

Published: September 8, 2022

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Abstract

The digital divide is not an unambiguous concept. Broadly speaking, the digital divide is the gap between those who have access to Information Computer and Technology and those who do not. However, the digital divide is multi-faceted and includes many dimensions such as access, affordability, quality and relevance. Given this reality, this article focuses on the impact of the digital divide on student performance in higher and university education in the Democratic Republic of Congo. Being among the countries where the digital divide takes the upper hand, we have decided from this research to evaluate the impact of the digital divide on the performance of students' results and the visibility of Congolese institutions to the rest of the world. To do so, we used statistical methods such as the Chi-square test and linear regression by sampling students from different parts of the Democratic Republic of Congo. After a systematic analysis of the data, we found that the digital divide has been present for a long time. We raised the consequences of this divide on the level of training of students and the visibility of institutions. Finally, we have proposed ways out.

Keywords

Higher and University Education (ESU in French), Digital, Performance

1. Introduction

The digital bubble has burst A few years ago, digital was indeed evolving in a limited sphere. Today, it permeates all professions, even the most traditional ones,

in all technologies, in all products and services! In fact, it has become very difficult to precisely define the contours of what digital is (Bigot et al., 2013). Today, digital technology is a growth lever for companies. Increased productivity, better competitiveness, saving time and money... Digital transformation is on everyone's lips, whether for companies or individuals. New technologies are gradually invading the entire professional world; even the smallest companies are choosing digital solutions, digital tools are now numerous to seduce companies (Boyer, Coridian, & Erlich, 2001). Despite all that digital offers us in the current era, some structures, companies do not want and others fail to rally behind the new technology (Béguin, 2008). The structures of the Democratic Republic of Congo are not far from this sad reality which gangrenes in the head of certain private and especially state companies.

University education being one of the key sectors for the development of a nation should not suffer any shortcomings, however almost all universities and higher education institutes in the Democratic Republic of Congo are not digitized, some for lack of infrastructure and others because they want to remain in the dark, and yet no university institution can be serious without being connected with the rest of the world on the one hand and being in possession of small applications computerizing the various tasks of the institution on the other hand. This unfortunate observation was confirmed on October 11, 2021 by His Excellency the Minister of ESU during his press conference: *"It is a shame to see that elsewhere digitization is evolving well and that here, even at the university level, everything is done manually: manual registration, manual enrollment, manual deliberation. Everything is manual (...) Digitization will also allow us to know the exact number of students"*. We risk being eyewitnesses of the descent of higher education and university into hell. Instead of passively attending to this great danger that the DRC is facing, we put ourselves at the service of the nation in order to understand the problems around digitization and propose concrete solutions. We are convinced that digitalization is full of promises. Let's take advantage of the opportunities offered by digital technologies!

The Ministry of Higher Education and Universities being one of the ministries of the Congolese government having almost all the executives of the country (professors, researchers, students) is among those who are in technological decline, and yet today who speaks science sees directly technology. The Congolese universities are almost unknown to the rest of the world, what they do or what the students realize as works is not within the reach of the public or the world and yet they are of inescapable and indisputable quality, the Congolese student is abandoned to his sad fate. Sometimes we ask ourselves questions such as: Who benefits from this technological setback? Is it the ill will of the politician? Lack of money and/or skills? From this questioning some people think that only God can save the ministry from this drift instead of getting to work and giving appropriate solutions. The problem of the Congolese is that they neglect what is important and take seriously what is negligible. Instead of taking our development in hand, the Congolese elite finds pleasure in spending their time quarrel-

ling for positions and tribal conflicts gangrene the head of the university environment. We are in danger of passively witnessing the descent into hell of the Ministry of Higher Education and Universities when it is supposed to be the most equipped given the competition with universities abroad. This technological setback poses not only the following problems for the Congolese government, institutions and universities but also for Congolese students:

- Degrees from Congolese universities are not always recognized abroad.
- Given the high number of universities in the country, a student who fails in an institution X , not wanting to fail, will go elsewhere the following year.
- The opaque management of university finances.
- Department unable to update its staff.
- People who have been dead for 15 to 20 years are still receiving their bonuses.
- Students do not have access to documentation.
- Congolese universities are not ranked among the best in Africa and even in the world.

The following observation has been of great concern to us and has led us to reflect on the main question of our research: Wouldn't the digitization of higher education and university activities in the Democratic Republic of Congo be a significant contribution, the solution to the problems that the latter is experiencing?

2. Materials Methods

2.1. Materials

We cannot approach the pedagogical and didactic aspect without making sure that we are sitting on a good base. The basis in our context is the management of students, which concerns many aspects among others the management of registrations, financial management, management of results, management of boarding schools, management of personnel, library, internet, and many other services. The first three are the foundation of academic activities of higher education and universities in the DRC. To satisfy these first three challenges would be a great contribution to this ministry because currently it is unable to give exactly the total number of students that a university in the country has taken at random, to verify the schooling of a student, to ensure the conditions in which the deliberations in the universities take place, to know in real time the financial management of one of the universities in the country. The advent of covid-19 has revealed the calamitous management of our institutions, because none of our institutions has been able to provide the online course during this period, what a shame! (Esteban Jr. & Cruz, 2021)

The delay in digitizing this sector poses the following problems for the Congolese government:

- The difficulty of controlling the number of students, each head of institution gives the supervisory authority the report according to his will, hence the impossibility or difficulty of giving the exact number of Congolese students

in Congolese universities.

- Students who fail at university X can move up to university Y the following year without anyone finding out.
- The opaque management of funds paid by students, hence the non-payment of agents in almost all public universities in the DRC.
- Unknown staff, sometimes rectors and executive directors are not aware of them.
- The credibility of our universities abroad.

Our concern is not to expose the nakedness of the Congolese education system, but to identify a serious problem, explore the elements that can explain it and propose possible solutions (Dahmani & Ragni, 2009).

We will say that this article serves as a mirror to the ministry; it mirrors itself, sees itself and recognizes itself as ugly. And if it is weak, it sinks into evil. If it is strong, it determines to change. In order to do so, we administered an online questionnaire on which more than 100 students responded.

2.2. Methods

We used the quantitative method by developing an online survey questionnaire to collect the necessary information on higher and university education in the Democratic Republic. Given the distance and the size of the country, we opted for this online questionnaire because it can reach a representative sample. This questionnaire is addressed to ministry officials, heads of institutions, teachers and students of higher education in the DRC. We then used the results of other institutions and universities already using digital technology. Once the data had been tabulated, we proceeded with a rigorous and systematic analysis of the data collected. We used the chi-square test and linear regression (Mohamed, 2021).

2.2.1. The χ^2 Test

Cross-tabulations offer the possibility of checking whether there is a relationship between two qualitative variables. The Chi-square test makes it possible to determine whether there is a dependency, to compare the distribution of the numbers in independent groups (Siegel & Castellan Jr., 1988). i.e. concerning different questions. This test consists first of all of formulating a null hypothesis, which assumes the absence of a relationship between the two variables. For example, we wish to test the dependence between the variables “internet connection” and “success in the first semester”. The null hypothesis is as follows: success in the first semester is not significantly related to access to the Internet. (Veysseyre, 2006) In the next step, we will calculate the differences between the theoretical and observed numbers. The theoretical numbers correspond to a distribution for which there is no relationship. The value obtained is compared to the limiting Chi-square according to different critical thresholds (0.1, 0.05 and 0.01), representing a non-significant difference between the two distributions. If the χ^2 value obtained is higher than this threshold value, then the null hypothesis is rejected, there is a significant difference, and the success in the first seme-

ster depends on the Internet consultation. Otherwise, if the observed Chi^2 is lower than the value indicated in the table, then the null hypothesis cannot be rejected. Thus, there is no significant difference between success and internet access.

2.2.2. Linear Regression

Multi-variate analyses offer the possibility of verifying whether the selected variables have an impact on the variable we are trying to explain, in this case, the average obtained in the first semester (Aïvazian, 1978). Furthermore, the variables will be classified according to the importance of their impact on the explanatory variable. Indeed, a coefficient is attributed to each variable, allowing us to evaluate the effect. We have chosen to perform a multivariate analysis on the average obtained in the first semester, which corresponds to a linear regression. Thus, each coefficient indicates whether the effect is positive or negative on the semester grade according to its sign. The multiple linear regression model is a generalization of the simple linear regression (between two variables). The objective is to try to explain the values of a variable, being as precise as possible (Chen & Popovich, 2002). The variable we are trying to explain, Y , is the grade obtained in the first semester. The variables that will explain it are represented by X . The model used is called the least squares line, it has the following form:

$$Y_i = a_i X_i + b_i + \varepsilon_i$$

ε_i is called the residual; it represents what is missing to fully explain the variable Y .

The significance of the model is evaluated from the coefficient of determination of the model, R^2 (Amadiou & Tricot, 2014). It indicates the percentage of the variance explained. The higher it is, the more explanatory the model is. The objective is to obtain the highest possible coefficient of determination. This is why we add variables, in order to check if the model is more significant.

3. Results and Discussion

We submitted our questionnaire in different groups of students and alumni, 150 students from different provinces responded to our questionnaire. We subdivide the presentation of the results into three.

3.1. Impact of the Digital Divide on Student Success

At this point, we have set ourselves the task of answering our initial questions, which are: can the digital divide negatively influence student success? Is there really a correlation between digital technology and success? To answer this question, we collected three variables: internet connection, digital library and success in the first semester. These three variables correspond to the questions submitted to the respondents, which follow: Do you have internet connection in your University? Do you have a digital library at your university? Did you pass your first semester exams? **Figure 1** below shows that there is a dependency between our two variables, which explains that the library can influence the academic result.

3.2. Impact of the Digital Divide on Knowledge in Congolese Universities

At this stage, we demonstrate how the digital divide causes Congolese universities to be unknown by linking two variables, the first of which is university website and recognition of your university abroad, as shown in **Figure 2**. These two variables correspond to the following questions that respondents were able to answer: Does your university have a website? And is your university known abroad?

Avez-vous une bibliothèque numérique au sein de votre Université? * Résultat Crosstabulation

Count		Résultat		
		ECHEC	REUSSITE	Total
Avez-vous une bibliothèque numérique au sein de votre Université?	Non	63	22	85
	Oui	16	10	26
	Total	79	32	111

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.535 ^a	1	.215		
Continuity Correction ^b	.984	1	.321		
Likelihood Ratio	1.479	1	.224		
Fisher's Exact Test				.226	.160
N of Valid Cases	111				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 7.50.

b. Computed only for a 2x2 table

Figure 1. Impact of the digital divide on student success.

Avez-vous la connexion internet dans votre Université? * Votre université est-elle connue à l'étranger? Crosstabulation

Count		Votre université est-elle connue à l'étranger?		
		Non	Oui	Total
Avez-vous la connexion internet dans votre Université?	Non	7	36	43
	Oui	7	61	68
	Total	14	97	111

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.856 ^a	1	.355		
Continuity Correction ^b	.399	1	.528		
Likelihood Ratio	.837	1	.360		
Fisher's Exact Test				.389	.261
N of Valid Cases	111				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.42.

b. Computed only for a 2x2 table

Figure 2. Impact of the digital divide on knowledge in Congolese universities.

**Avez-vous la connexion internet dans votre Université? * Résultat
Crosstabulation**

Count		Résultat		
		ECHEC	REUSSITE	Total
Avez-vous la connexion internet dans votre Université?	Non	30	13	43
	Oui	49	19	68
	Total	79	32	111

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.067 ^a	1	.795		
Continuity Correction ^b	.002	1	.964		
Likelihood Ratio	.067	1	.795		
Fisher's Exact Test				.832	.479
N of Valid Cases	111				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 12.40.

b. Computed only for a 2x2 table

Figure 3. Impact of post-course internet use on student performance.

3.3. Impact of Post-Course Internet Use on Student Outcomes

Most young people spend their time after school surfing the net, some for entertainment (social networks and others) and others for documentation to keep up with the material.

This third step, presented in **Figure 3**, consists in verifying whether the students' failures are a function of the use of the Internet (entertainment) after class.

4. Conclusion and Recommendations

Before concluding, it is important to recall the framework of our research. We surveyed students at Congolese universities by questionnaire. More than 100 students responded to the online questionnaire that was sent to them via a hyper-text link. Our sample is not really representative of all Congolese students, because only those who have at least a smartphone or iPhone or computer responded. The data collected is substantial and allowed us to perform a large number of statistical tests. Thanks to this, we were able to verify our hypotheses and better understand the impact of the digital divide on the performance of the higher education and university sector. The results obtained allow us to affirm that there is a scientific interest in further research in this area. The research challenges were to better understand the use of digital technology by students. Then, to verify the existence of a link between the digital divide and the success of students in their exams. Then to verify if there is a link between the digital divide and the knowledge of Congolese universities abroad. Finally, to verify if there is a correlation between the use of the internet connection after class and the success of students in the first semester.

We found that the necessary means are not made available to students for better learning and this negatively influences the result and the absence of digital

infrastructure does not offer the possibility to Congolese universities to be known to the rest of the world, which would justify the expulsion of some Congolese students abroad. The others use the internet connection for research but we found that the students we surveyed use it for entertainment which leads to catastrophic failures. Given the results of our investigations and anxious to do better, unfortunately with no support, we address the cry of alarm to the Congolese government to take the possible measures in order to frame the youth whose future seems to be mortgaged, and to arrive there we propose to them what follows: the increase of the annual budget related to education and research, to be equipped with sufficient infrastructures for digital, intelligent software in intranet to solve the manual problem inside the Congolese universities; to have a central server for all the Congolese students, internet access for all, requirement and application of the digital tools and infrastructures during and after the course. The implementation of all these requirements will raise the Congolese educational level, and the trained students will be useful first for themselves and for the Congolese nation.

In conclusion, this field is wider and offers the possibility to other researchers to open new research horizons, we invite them to border this or that point that we could not realize in this research because no human work would be free of flaws.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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