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COVID-19 has Turned Things Upside Down: E-Learning in Bukavu City in the Democratic Republic of the Congo

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ABSTRACT

In the Democratic Republic of Congo (DRC), e-learning is a new concept for academic institutions. COVID-19 has reignited the debate about using Information and Communication Technology (ICT) within institutions. Technology is evolving exponentially, and Information and Communication Technology based is now essential in all sectors. During the lockdown, due to the COVID-19 pandemic, which led to the educational institution's closure, e-learning became the rule, and face-to-face (in-person) teaching was the exception. Based on qualitative data on information and communication technology use with non-structured interviews in higher institutions in Bukavu, this paper attempts to understand the obstacles to the transition from face-to-face teaching to e-learning during the COVID-19 period. Our results show that many educational institutions lack information and communication technology tools and infrastructures. The COVID-19 pandemic advent brought most educational institutions to stop activities.

Keywords: COVID-19; E-learning; Higher education; ICT; Instructors

INTRODUCTION

In the Democratic Republic of Congo (DRC), e-learning is a new concept for academic institutions. While COVID-19 has reignited the debate about using ICT with online education, higher education institutions have responded differently to this concern [1]. Indeed, most countries worldwide have been forced to close all activities in several sectors, including the higher education sector, to contain the spread of the COVID-19 pandemic (UNESCO, 2020) [2]. The closure of educational institutions has condemned several students and instructors to work at home [3]. However, there was an alternative for some universities and institutions equipped with the tools needed for ICT use, online training, or e-learning [4,5]. Furthermore, as Advocates, this is an opportunity to rethink the constructivist-interactionist paradigm in transmitting knowledge. For several decades, online training has been advocated to be used in addition to face-to-face training, which calls hybrid learning and training [6]. While the hybrid model was far from unanimous [7-9]. The advent of COVID-19 has strengthened supporters of the e-learning mode as recommended by the UNESCO [10]. However, e-learning requires prerequisites for its implementation, familiarisation, and possession of the necessary equipment to use ICT [11-13]. The lack of adequate ICT equipment has been and continues to be one of the barriers to online education in several developing countries. Indeed, professionals must be well equipped in ICT to cope with the era's expansion. To achieve this, institutions working in the education sector must play a significant role in training instructors and learners simultaneously [14]. Several countries have integrated computer science courses from primary to higher education [8,9]. Nevertheless, institutions with a significant mandate in implementing ICT face access to the necessary tools. However, ICT has been an asset in dealing with the school closure due to COVID-19, especially during the lockdown. The challenge is particularly great for higher education institutions facing competition from their products in the labour market. The COVID-19 pandemic redefines the balance of power regarding the choice of institutions, which we call "the upheaval". Thus, in Bukavu, higher institutions face student numbers because they are deemed unviable by the communi-

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ty. Besides, these institutions have a problem with funding their activities. The DRC, in general, and the public administration, in particular, have the lowest level of the telecommunication infrastructure index, which is the source of the glaring delay in the development of e-governance [15]. This lack of computer equipment hurts performance and speed in information processing. Institutions in the education area are not spared. As Mubanga pointed out, implementing ICT in the DRC is symptomatic of the pitfalls faced by less developed countries and, consequently, by African governments [16]. Higher education institutions do not receive any state subsidies in the DRC. Nowadays, these institutions must be resilient by offering online course sessions because of COVID-19. However, as everything strives to become what it potentially has, many institutions struggle to attach themselves to the e-learning system because they are underequipped in ICT [17,18]. As Racette, Desjardins, Bourdages-Sylvain and Houle, underlined, using ICT in teaching is done by trial and error. We observe this situation in some institutions in Bukavu that migrated to the virtual teaching mode during the lockdown. Mirza and Al-Abdulkareem show that ICT met resistance both internally (instructors) and external (environment) [9]. This paper aims to understand how the lack of information and technology equipment and low ICT use in universities and institutions limit e-learning. E-learning is atypical and complex, as it uses sophisticated equipment [7]. Despite the benefits of using ICT, it is crucial to recognise that its implementation is not always evident in landlocked countries such as the DRC. The modalities of its execution depend on the actors' will to appropriate it. Still, it is also necessary to have infrastructures and adapted equipment (for example, Internet connection, computers and electricity). While social networks are increasing worldwide, the availability of computer equipment, qualified staff and infrastructure that can house ICT for educational purposes remains a real challenge in many developing countries. While ICT boosts economic development, universities and institutions struggle to have adequate equipment [9,19]. Research on the role of ICT and e-learning is becoming increasingly diverse. The lack of proven ICT knowledge for instructors impedes ICT use in the education system [9,15,20,21]. Stresses the importance of staff training for properly using ICT, while Sarkar underlines the role of ICT for educational development and countries' economic development [22]. The conceptual framework for this work is e-learning. This study uses data from 103 instructors working in 6 higher education institutions in the City of Bukavu in South Kivu province in the DRC. Using qualitative analysis, COVID-19 has revealed a failure of the education system in the context of the DRC. Indeed, several higher education institutions in Bukavu, particularly in the DRC globally, suffer from a problem of under-equipment in ICT tools; this has limited their transition from face-to-face to e-learning.

The Place of ICT in Higher Education

ICT in education dated to the 1960's when courses were broadcast [23]. This new way of learning has revolutionised teaching. Nowadays, it has become possible to learn without seeing an instructor says that the shift from face-to-face to distance education has been a political wish for several years [24]. With public education spending restraint policies, the higher education sector begins to apply the "business model" to minimise costs. Universities were then bureaucratised and streamlined, with "New Public Management. In higher education [25]. New Public Management" is an approach to managing public services used in government and public service institutions and organisations at different levels. University researchers introduced the term in the United Kingdom and Australia in the 1970's. Due to this structural reorganisation, instructors' work has changed with ICT integration [9]. If yesterday's use of ICT in education was dictated by other modernisation concerns and rationalisation, today, it is the COVID-19 pandemic that revives the debate [26]. If COVID-19 does not entirely change the teaching mode, it is evident that hybrid teaching becomes the rule [3]. Educational institutions face unparalleled competition, leading in disseminating knowledge [21]. This competition forces them to follow the path of continuous technical innovation. Thus, higher education institutions must put people in the labour market to meet the ever-changing society's needs. The answer to these requirements includes ICT integration [8]. Lefebvre and Fournier raise four steps to achieve the use of ICT for educational purposes: The awareness stage, personal use, professional use, and the stage of academic service in the end [26]. There are five steps of instructors' development in discovering ICT: The fundamental discovery (entry) of technology, adoption, adaptation, appropriation, and invention. Educational institutions must already strategically position themselves in producing and disseminating knowledge by critically selecting different technologies before using them in the education sector [11,27]. Technology today leaves no sector indifferent, and higher education remains a concern with globalisation [11]. The globalization of knowledge concerns both the production of this knowledge (through scientific research and publications) and its dissemination (through teachings), requiring cognitive ability [21,27,28]. Institutions can interchange instructors and knowledge with the "School Net" initiatives [8]. Thus, with ICT adoption, teaching and learning have also undergone profound transformations. ICT now generates a different dynamic both in the classroom and in the communication relationship between instructors-students [14]. Access to e-books, for instance, allows an unlimited number of people to read the same document simultaneously. Also, Sarkar demonstrated that learners and instructors no longer need to rely solely on printed books, articles or other physical media documents housed in libraries [24]. The integration of ICT into the education system has allowed skills development far beyond the specialty of teaching and has led students to move from content education to skills education [6,12,27]. Indeed, ICT instructors are forced to learn to manipulate computer tools without computer scientists. As a share, ICT positively impact learning motivation although some people remain skeptical [24]. However, Gunga and Ricketts show that efforts in using ICT in education systems have influenced the increase in informal education [28]. The motivational aspects of learning concerning ICT are always contradictory and vary from one environment to another [13]. This positive impact of ICT usability is linked to working with new support, more individualized work, increased autonomy, and frequent and rapid reactions through more accelerated communication [29]. ICT provides a framework for continuing education for students and trainers in and out of the classroom. Therefore, using ICT in the learning process is a strategic choice to captivate the supported attention of the teacher through sounds, images, animations, and a PowerPoint presentation, for example. In addition to education, ICT is involved in

several other administrative activities in the education sector. For instance, they are used in accounting, cooperation, security, etc., making unavoidable ICT in today's era.

E-Learning and Distance Learning

At first glance, there is a distinction between distance education and e-learning [30]. These two learning methods also differ from teaching in person (or face-to-face in the classroom). E-learning enables learning through a computer connected to the Internet. Educational content is put online *via* a module (Moodle or Microsoft teams, for example) that the institution sets up. In this context, the learner can be located geographically and take classes to interact directly with instructors. This practice is one of the main benefits of e-learning found during the COVID-19 period [4]. In addition to these advantages, e-learning also has drawbacks, such as feelings of loneliness. This teaching method is widely used in relatively short sessions in house enterprises or training centers. Online learning may be done in live classes with an instructor where interaction is valuable and instantaneous [6]. It may also be pre-recorded courses (delayed courses) to be replayed or downloaded by learners differently than their broadcast time. As a result, there is a time lag for pre-registered classes. However, distance learning may not necessarily be online. That is what sets it apart from e-learning. Distance training can be by mail (sending courses) by email, phone, post, etc. Distance training is done synchronised; instructors can get the lessons they want [6]. Distance training can be individual or collective. This method of training is thus more flexible than e-learning. Distance education was set up with the object of democratising education because it allows for an economy of scale and greater flexibility in learning [14,31]. Distance learning is often confused with e-learning [30]. Distance education involves an organisation of work, with or without computer tools, with teaching with ICT requiring special equipment (computers, software, Internet, etc.) [13,31]. E-learning and distance learning are similar in many ways. Both processes describe learning that is not done face to face. Suppose distance learning is poorly identified [31]. In that case, e-learning is more accurate because it implies a connection using a computer, tablet, or telephone, thus providing a framework for pedagogy and learning. These two methods (remote training and e-learning) were used during the COVID-19 lockdown period.

METHODOLOGY

The research question of this article is the following: How does the lack of adoption and use of ICT in higher education institutions in the City of Bukavu hinders the transition from face-to-face to online education during the Coronavirus pandemic period? Higher education instructors are the target population of this study. This population consists of what is known as "academic and scientific staff." Academic staff are all instructors with a doctoral degree (PhD) recognised by the Ministry of Higher Education in the DRC. The scientific team includes heads of work called "chefs de travaux" and assistants. The "Chefs de travaux" are instructors recruited based on "excellence" at the end of their academic course (BAC+5) and who continue their doctoral studies with a minimum of four years seniority in the teaching career. Assistants are also recruited based on the "excellence" of their academic record; they are generally young, with less than four years' experience in a career in higher education. Academic and scientific staff from 6 Bukavu institutions was involved in this study (three universities and three higher institutes). We have the Université Catholique de Bukavu (UCB-the oldest University in Bukavu town), the Université Evangélique en Afrique (UEA), the Université Officielle de Bukavu (UOB), the Institut Supérieur de Développement Rural (ISDR), the Institut Supérieur Pédagogique (ISP) and the Institut Supérieur des Techniques Médicales (ISTM). The higher institute welcomes and trains students with a vocation of high level and specialised senior technicians. The university is more generalist and teaches students to develop scientific theories based on extensive research. In most cases, the Higher Institute and the University organise two cycles (bachelor, graduate and postgraduate degree) [32]. 6 institutions were selected based on their seniority and their reputation. To participate in the survey, the individual should have at least three years of seniority in higher education as an academic and scientific staff. Overall, 103 instructors (51 assistants, 33 heads of work and 19 professors with a PhD) were involved in the data collection survey. We collected information about accessing information technology systems and ICT services in the respective institutions regarding qualitative data. Interviewees were met at their workplaces (i.e., at the faculty for those working in universities and higher education sections). A brief introduction was made to obtain the respondent's consent. Only consenting persons were interviewed. The areas of study and teaching identified among those surveyed are the exact sciences, social sciences, human resources, and technical sciences. Among the 103 academic and scientific staff involved, only 16 were female. Regarding age, the professors (PhD) involved are in the 39-67 age group; heads of work are in the age range between 30 and 69 years, and the assistants are between 24 and 41 years old. Qualitative data were collected using an interview guide. Questions focused on ICT use both in research and teaching in higher education institutions in Bukavu town. The questionnaire was structured as follows. Part of it was general information on computer tools in everyday life (possession of smartphones, laptops, etc.). A second part focused on in depth knowledge of ICT use in academic life (e.g., having received training in computer science). The equipment, computer tools by higher education institutions computers, computer rooms, Internet, projectors, and the last part allowed us to have information on the obstacles to using ICT in the higher education sector in Bukavu, followed by the recommendations. The questions were open, and the interviewee spoke freely. A note block was used for deferred everything the respondent said. After receiving all the information, the data were encoded in a word document to facilitate analysis. Regarding data processing, a thematic content analysis was privileged in this study, according to the criteria recommended by Negura, Dany Lejeune [33-35]. Its material is generally qualitative; it includes documents, interviews, letters, testimonies, etc. His method and approach remain closer to quantitative, numerical processing, certain mathematical operations, and an interpretable inference. This tool, which is both rich and complex, can be used in most investigative processes. With the content analysis, we systematically and methodically reviewed the transcripts of the various discussions with interviewees. Based on the research question, we read these transcripts. We carried out the thematic or categorical analysis with the reading and subsequent rereading of

the transcripts. This categorization allowed us to identify different trends in understanding the problem under analysis. This back and forth in the document was a crucial moment to avoid arbitrariness. This rigor ensures exclusivity and guarantees the scientificity of the method [35] (**Figures 1-3**).

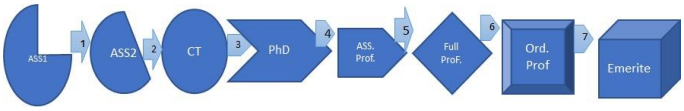

Figure 1: Career development of higher education and university teaching staff in the DRC.

Figure 2: Logos of the institutions involved in the study.

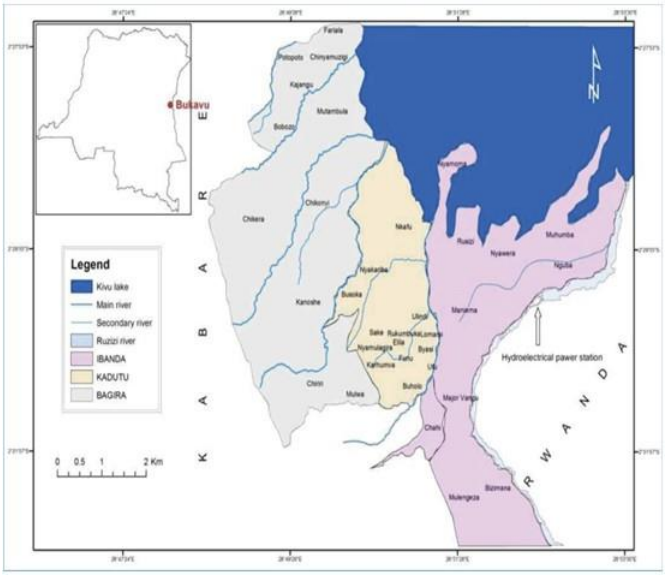

Figure 3: Map of the city of Bukavu.

RESULTS

Instructor's Access to Information Technology Systems

The results show that, on average, higher education instructors in Bukavu have access to ICT in various ways. We found that young instructors who graduated with a bachelor's degree after 2010 were more likely to contact ICT than the older ones who graduated before 2000. Thus, on average, assistants and some "Chefs de travaux" have more advanced ICT knowledge than most instructors of relatively advanced age. Computer science as it is known today has undergone a drastic evolution. Many people, especially the older ones, have not practically adapted easily to change, such as the younger ones now born and whose use is trivial. We also found that much higher education and university instructors in Bukavu, the minority, do not have laptops [36]. Although owning a computer is not decisive enough to explain access to ICT, the lack of a clean computer for each instructor still lays bare the difficulties these instructors face in updating themselves. While the use of the computer tool is still a concern for many instructors, the shift from face-to-face to online teaching has encountered obstacles. This situation is mainly from the institutions that did not have enough time to prepare since the COVID-19 pandemic surprised everyone. Nevertheless, we found that all instructors interviewed have at least one mobile phone, regardless of brand or functionality. Some use mobile phones for traditional functions, making and receiving phone calls and messaging services. Most instructors use their phones, sophisticated telephones, social networks, and research. An interlocutor with a "good" phone (smartphone) but deprived of a computer says: "My phone allows me to store some of my files there, as I have not bought a computer yet. I also use it to take pictures of some pages of books and other documents I meet here and there. "Using a mobile phone is not discussed using the computer tool, especially when discussing ICT in the education sector. In this situation, instructors have minimum access to ICT, but this accessibility remains limited and questionable. Access to ICT differs from one institution to another. For example, at the Université Catholique de Bukavu, teachers stated that instructors' access to computer science is part of the "excellence quality" their institution has been involved with the Agence Universitaire de la Francophonie. During the COVID-19 lockdown that the world experienced from March 2020, the habit of using computer tools in past teachings at the Université Catholique de Bukavu was a significant asset that facilitated the transition from the presidential teaching method to online teaching. Access to ICT service today requires the possession of a laptop. Our results show that some instructors in higher education institutions do not have computers. Access to ICT services also requires community ownership. Several instructors have also demonstrated that their institutions do not distribute computers to limit the use of ICT. One instructor told us that: "… the institution must find ways to equip every instructor with a computer for the modernisation of higher education." Other instructors, especially assistants and "chefs de travaux", add that low income does not make it easier for them to acquire personal computers. However, we found some instructors' resistance to using and accessing ICT during teaching, mostly older. This resistance is due to some instructors' lack of interest in learning ICT. More senior instructors are generally not interested enough to know. These instructors teach only with printed books. Older instructors even go so far as to say that learning is about young people. "…The use of computers is a matter for young people; in our time, computer stories did not exist. Everything on the computer is in the printed books..." As COVID-19 surprised everyone, instructors without knowledge of ICT use did not have an opportunity to move from face-to-face teaching to online teaching.

ICT in Bukavu Higher Education Institutions

In general, the African education system faces a glaring lack of adequate infrastructure that could facilitate ICT integration. Successful ICT integration in all areas requires infrastructure and equipment acquisition investment that adequately meets ICT prerequisites. The results underline that in Bukavu, as high-

lighted, the lack of infrastructure and equipment is a significant obstacle to integrating ICT in higher education [21]. Electricity does not power most classrooms. It is not easy to think of using ICT without electrical energy. All these obstacles have caused several institutions and universities in Bukavu to close during the lockdown caused by COVID-19. One of the respondents said: "Electricity energy is a major handicap for the city of Bukavu. Although the institution would be willing to use ICT, the absence associated with the power cut is the rule in Bukavu." With the advent of the COVID-19 pandemic, it is unclear whether lessons are being delivered online in many institutions. Some institutions use generators as an alternative to remedy the problem of untimely power outages. However, this alternative is an additional cost to these institutions, yet most do not have state subsidies from the government in operating expenses. The lack of electricity also negatively affects acquiring computer equipment, purchasing, and accessing the Internet. Out of the 6 institutions involved in this study, only the Université Catholique de Bukavu and the Université Evangelique Afrique (these two universities are private institutions) are permanently equipped with the Internet. It is also in the two institutions where ICT integration seems to have gained momentum. Indeed, the Internet in Bukavu and the DRC globally is a headache because of its cost and quality, leaving something desired. An optic fiber connection does not cover the DRC, facilitating a broadband connection. Gunga and Ricketts had already stressed the importance of the Internet in integrating e-learning [28]. Another factor limiting ICT integration into higher education in Bukavu is the logistical absence in these universities and institutions. These institutions lack adequate infrastructure. Still, the lack of computer equipment (computers and their devices, software, etc.) does not facilitate ICT use in the higher education sector in Bukavu. One instructor told us: "How do you want us to use ICT during the course when our institution has only two overhead projectors..." In several institutions, teaching is done face to face in such a context. As a result, during this period of COVID-19, most institutions closed their doors until the pandemic was over. Only UCB, one of the few institutions in the DRC with the necessary equipment and qualified staff, could switch to online teaching mode through the "Moodle platform" [37]. Being well equipped with a computer science faculty, the UCB used its staff's expertise to adapt to the situation imposed by the COVID-19 by updating in record time instructors who had not yet finished their hourly loads. Thus, with the internet connection and the facilities available to the UCB, instructors could work at the university and teach online. This new online training practice will undoubtedly impact higher education and university institutions' future choices; what we call here is the upheaval due to the COVID-19 Pandemic. Despite efforts to adopt e-learning, students' access to this teaching technique remains challenging. This reality is not far from what Bao described at Peking University in China "… students often have problems such as lack of self-discipline, suitable learning materials, or good learning environments when they are self-isolated at home. "Most students currently have a smartphone to fit in and take online courses, but the real problem is the means of internet access. With the COVID-19 pandemic that blocked all academic and economic activities, many people have seen their sources of income negatively affected. The low standard of living of the population does not allow students to have the necessary tools to study online.

DISCUSSION

COVID-19 has created a significant problem for higher education institutions [1]. This study shows that skills can facilitate ICT utilisation in the head of the instructors in Bukavu, particularly at the UCB. However, as Mastafi points out, there is a need for training in the information technology field [21]. In the DRC, Kombo Yetilo, Mubanga show that the low level of computer training limits its expansion in the country and, therefore, e-learning [15,16]. The advent of COVID-19 has laid bare the failure of the Congolese education system, which needs to be rethought. Thus, this pandemic should allow political leaders and education partners in the DRC to adopt a policy to equip educational institutions with computer equipment and qualified staff to face contingencies such as COVID-19. Lefebvre and Fournier establish that training instructors in ICT use are essential [26]. Moreover, for Mastafi Peciuliauskiene et al, learning ICT for instructors must be a source of change and development in the education sector [21,22]. The COVID-19 pandemic is just a drop that has spilt the mud. More than ever, telework has grown, and no activity is spared. Results are consistent with previous studies on the importance of instructors' use of ICT [26,30,31]. Indeed, the lack of infrastructure remains the biggest obstacle to implementing ICT (and thus e-learning) in higher education in Bukavu in many institutions, as stressed by Mubanga in the RDC globally [16]. While some countries, most developed countries, have already set the stage for the technological revolution, the limit of ICT adoption in developing countries remains mainly due to the absence of related infrastructure [11,21]. Investment in electrical energy infrastructure (classrooms meeting standard norms) should be a priority for the public authorities (public institutions) and the heads of private institutions in the DRC. Our result is similar to what Mahenge and Sanga found in Tanzania about resource constraints and network bandwidth [12]. These ICT barriers have harmed the materialisation of e-learning during the COVID-19 containment. The difficulty for most higher education institutions in the DRC to migrate from face-to-face to e-learning should serve as lessons for the ministry of education to be rigorous in creating and accreditation new institutions in this sector. While many instructors are unanimous about the importance of ICT in teaching, the lack of computer tools hinders technological penetration in pedagogy. Mastafi shows that under equipment of institutions limits the computerisation of the education system in developing countries, especially in Africa [21]. The findings of much research Massin, Racette et al, highlight that the appropriate use of technology in education is dictated by acquiring equipment [23,38]. Unfortunately, several African institutions have so far suffered from the lack of such equipment. Bukavu's lack of computer equipment has not allowed educational institutions to switch quickly from face-to-face to online teaching. Therefore, the COVID-19 pandemic reminded the DRC's political leaders and external donors of the need to computerize all sectors of life in the country. Alongside the lack of infrastructure, we also have resistance to change in implementing ICT in higher education. Sauvé, Wright and St-Pierre demonstrate four kinds of resistance in the head of instructors: Resistance related to the economics of teaching, resistance associated with the transformation of the pedagogical style, the integration of ICT

into organisations and opposition concerning the integration of ICT into professional practice [14]. As mentioned above, resistance highlighted here concerns only a portion of the instructors involved in the study, specifically the older ones. Therefore, redefining the criteria for recruiting staff in the higher education sector in the DRC and the retirement of those who cannot update themselves is essential. Kennel adds that the non-use of ICT in education is primarily due to a lack of interest on the part of instructors. Furthermore, Schulz et al confirmed that missing ICT tools may limit the use of technology in teaching and e-learning [6,19]. Guri-Rosenblit also points to the cost and human ability to adapt to new technologies [30]. However, the current COVID-19 crisis only precipitates ICT adoption for those still following in the footsteps, mainly for universities and institutions. They must have palliative solutions to the coronavirus crisis, which use ICT. This situation further reinforces what Sarkar had already stressed about the importance of ICT in learning and the motivations it provides for both students and instructors. Universities and institutions' (non)-use of ICT in education leads to the redistribution of cards in credibility, reputation, and student numbers in these institutions with the situation painted, it is evident that ICT adoption "almost forced by the COVID-19" is not smooth for many establishments [22]. Of course, several other conditions are required successfully integrate ICT higher education institutes in Bukavu. For example, access to electricity, Internet, software, etc. This result is consistent with Massin, who found in a study conducted in France that we have technical problems and a lack of control over ICT, among other factors limiting digital resource use [23]. Thus, COVID-19 has instead disrupted teaching habits in universities and institutions and could lead to the closure of some institutions that may not have the opportunity to deliver online teaching. Thus, as Sacré et al demonstrate, COVID-19 will bring about pedagogical transformations worldwide [3]. With the pandemic, many activities are being done online (telework), and e-learning is now commonplace, especially in universities and institutions well equipped with ICT. The question that remains dangling is about the consequences of the COVID-19 crisis when we know that universities and institutions have not adapted to the new online teaching method [4]. It is the case of most universities and institutions in Bukavu and the DRC globally. Setiawan has also shown that COVID-19 impacts the education system and negatively affects all sectors [10]. Thus, the coronavirus pandemic will turn everything upside down in developing countries where the education system was criticised. This crisis could, therefore, aggravate the situation. For example, non-migration to e-learning in education results in the perturbation of the academic calendar throughout the DRC [39-41].

CONCLUSION

Instructors' competence in using ICT in Bukavu higher education institutions is not to be questioned despite a permanent update. Indeed, technological literacy is needed with the exponential evolution observed in ICT in both instructors and business workers. This paper analyzed the barriers limiting ICT implementation in Bukavu higher education institutions and the impact on online education, particularly during the coronavirus pandemic, which resulted in the closure of several higher education and university institutions. More than ever, the COVID-19 pandemic has revived the debate over online and distance education. While educational institutions have been forced to close, the demand for digital transformation in education has been strong, especially in developed countries. Several institutions with infrastructure and computer equipment problems suspended activities in developing countries during the COVID-19 containment period. The logical cause is that these institutions have difficulty switching to online education. Through the survey results, we note that even in the present level teaching mode, many higher education institutions use ICT in training only in a limited way. Higher education institutions were indeed unable to cope with the COVID-19 pandemic by only stopping activities. While it is difficult to know the impact of this pandemic on parents' and students' perceptions of different institutions, it can also be said that COVID-19 will change the behaviour of institutions regarding ICT investment. Thus, the post-a-19 could be further from the COVID-19 lead in higher education sectors, Bukavu and throughout the DRC. In this sense, a contextual study and analysis of the effects of COVID-19 are essential for formulating recommendations and public policies. Bao proposed some strategies that the higher education institution may apply to achieve a smooth transition to online teaching. At this level, we can advise that higher education institutions should begin experimenting with distance learning before transitioning to online learning, which requires more resources.

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CONFLICT OF INTEREST

The author's declared that they have no conflict of interest.

REFERENCE

1. Crawford J, Butler-Henderson K, Rudolph J, Glowatz M (2020) Covid-19: 20 countries' higher education intra-period digital pedagogy responses. J Applied Teach Learn 3(1).
2. UNESCO (2020). COVID-19 educational disruption and response.
3. Sacré M, Toczek MC, Policard F, Serres G, Paulet C, et al. (2020) L'efficacité d'un dispositif d'enseignement hybride en fonction des caractéristiques des étudiants. Revue internationale des technologies en pédagogie universitaire 17(2): 9-29.
4. Toquero CM (2020) Challenges and opportunities for higher education amid the covid-19 pandemic: The philippine context. Pedagog Res 5(4): 1-5.
5. Linard M (1994) La distance en formation: Une occasion de repenser l'acte d'apprendre. Accès à la Formation à Distance, Clés pour undéveloppement Durable 46-55.
6. Kennel S (2019) L'usage de Moodle à l'université: Vers une typologie des utilisateurs parmi les enseignants-chercheurs 16(3): 33.
7. Depover C, Karsenti T, Komis V (2007) Enseigner avec les technologies: Favoriser les apprentissages, développer des compétences. PUQ.
8. Mequanint D, Lemma D (2014) L'intégration des TIC en

pédagogie dans les pays en voie de développement. Le cas de l'Éthiopie. Revue internationale d'éducation de Sèvres. (67): 75-84.

9. Mirza AA, Al-Abdulkareem M (2011) Models of e-learning adopted in the Middle East. App comput info 9(2): 83-93.
10. Setiawan AR (2020) Scientific literacy worksheets for distance learning in the topic of Coronavirus 2019 (COVID-19).
11. Dahmani A (2004) Les TIC: Une chance pour l'Afrique. Gabas JJ, Société numérique et développement en Afrique. 1ère edition. Karthala 13-34.
12. Mahenge MP, Sanga C (2016) ICT for e-learning in three higher education institutions in Tanzania. Knowledge Manag E-Learning: An Int J 8(1): 200-212.
13. Karsenti T (2003) Favoriser la motivation et la réussite en contexte scolaire: Les TIC feront-elles mouche. Vie pédagogique 127: 27-32.
14. Sauvé L, Wright A, Pierre C (2004) Formation des formateurs en ligne: Obstacles, rôles et compétences. Revue internationale des technologies en pédagogie universitaire 1(2): 14-20.
15. Yetilo JK (2012) L'administration publique congolaise aux prises avec les TIC: Innovations, défis et perspectives. Le cas de la publication des résultats des examens d'État. Télescope 18(1-2): 84-101.
16. Mubanga JP (2018) La fracture numérique en République Démocratique du Congo. Revue Internationale de droit des données et du numérique 4: 141-160.
17. Biesta GJ, Burbules NC (2003) Pragmatism and educational research. Rowman and Littlefield.
18. Racette N Desjardins G, Bourdages S, Houle M (2019) La gestion des tuteurs en ligne, pour un tutorat de qualité. Ritpu Ijthe 16(3): 57-72.
19. Schulz R, Isabwe GM, Reichert F (2015) Investigating teachers motivation to use ICT tools in higher education. Internet Technologies and Applications 62-67.
20. Mastafi M (2014) Obstacles à l'intégration des technologies de l'information et de la communication (TIC) dans le système éducatif marocain. Panthéon Assas Paris 2: 50-65. [Research Gate]
21. Mastafi M (2015) Intégrer les TIC dans l'enseignement: Quelles compétences pour les enseignants? Formation et profession 23(2): 29-47.
22. Peciuliauskiene P, Tamoliune G, Trepule E (2022) Exploring the roles of information search and information evaluation literacy and pre-service teachers' ICT self-efficacy in teaching. Int J Educ Technol High Educ 19(33): 1-19.
23. Massin S (2019) L'utilisation de ressources numériques en début de premier cycle universitaire: Profils individuels et déterminants liés aux ressources. Revue internationale des technologies en pédagogie 16(3): 1.
24. Sarkar S (2012) The role of information and communication technology (ICT) in higher education for the 21st century. Sci 1(1): 30-41.
25. Enders J, de Boer H, Leišytė L (2009) New public management and the academic profession: The rationalisation of academic work revisited In: Enders Jde Weert E.
26. Lefebvre S, Fournier H (2014) Utilisations personnelles, professionnelles et pédagogiques des TIC par de futurs enseignants et des enseignants. Revue internationale des technologies en pédagogie universitaire 11(2): 38-51.
27. Romero M (2017) Usages créatifs du numérique pour l'apprentissage au XXIe siècle.
28. Gunga SO, Ricketts IW (2008) The Prospects for E-Learning Revolution in Education: A philosophical analysis. Educ Philos Theory 40(2): 294–314.
29. Greenan N, Hamon-Cholet S, Walkowiak E (2003) Autonomie et communication dans le travail: Les effets des nouvelles technologies.
30. Guri-Rosenbli S (2006) Eight paradoxes in the implementation process of e-learning in higher education. Distances et savoirs 4(2): 155-179.
31. Baldé D (2004) Enseignement à distance: Stratégie alternative d'amélioration de l'accès à l'enseignement supérieur en République de Guinée. Doctoral dissertation, Versailles-St Quentin en Yvelines.
32. Murhi Mihigo I (2016) Privatisation du secteur éducatif en République Démocratique.
33. Negura L(2006) L'analyse de contenu dans l'étude des représentations sociales. Sociologies.
34. Dany L (2016) Analyse qualitative du contenu des représentations sociales. Les représentations sociales 85-102
35. Lejeune C (2017) Analyser les contenus, les discours ou les vécus? À chaque méthode ses logiciels!. Les méthodes qualitatives en psychologie et sciences humaines de la santé 203-224.
36. Berry G, Dowek G, Abiteboul S, Archambault JP, Balagué C, et al. (2013) L'enseignement de l'informatique en France Il est urgent de ne plus attendre. Rapport de l'Académie des sciences.
37. Online document 24th congo (2020) Sud-kivu: Enseignement en ligne, l'université Catholique de Bukavu est la première institution à l'adopter.
38. Racette N, Desjardins G, Bourdages S, Houle M (2019) La gestion des tuteurs en ligne, pour un tutorat de qualité. Ritpu Ijthe 16(3): 57-72.
39. Bala, M (2018) Use of ICT in higher education. Multidisciplinary higher education, research, dynamics and concepts: Opportunities and challenges for sustainable development. 41(1): 978-93-8766.
40. Bao W (2020) COVID-19 and online teaching in higher education: A case study of Peking University. Human behaviour and emerging technologies 2(2): 113-115.
41. Djeflat A (2007) Rôle et place des TIC dans une économie fondée sur la connaissance. Le Maghreb dans l'économie numérique, IRMC.