PERSONAL STUDY, PEER ENGAGEMENT AND LEARNING INFRASTRUCTURE ACCESS DURING COVID-19 SHOCK: IMPLICATION FOR RURAL BASED-UNIVERSITY STUDENTS' IN 4IR

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ABSTRACT

Covid-19 pandemic has not only affected educational outcomes of students', it also has an impact on the elements that enhance learning. The purpose of this study is to examine students' experiences relating to factors that influence learning outcomes, during the inevitable remote learning. Consequently, a qualitative research method was adopted and data was obtained through an open-ended questionnaire from students in one South African University. The data obtained were analyzed using thematic analysis. From the analysis, the identified themes include, personal study, peer engagement, and learning infrastructure access during the inevitable remote learning. The study reveals that personal study is being affected due to the unfavorable study environment of the students. Furthermore, unstable and inadequate access to intangible learning infrastructural facilities such as electricity and internet connection are identified as challenges to remote learning. Generally, the study voices the existing socioeconomic, digital, and geographical inequalities in the South African space which should be adequately addressed. The study concludes that in order not to leave any student behind in terms of higher education training, absolute adoption of 4IR technologies for learning might be impracticable. Furthermore, since face to face learning is indispensable, adoption and implementation of blended or hybrid teaching and learning techniques, and on-campus digital training by rural based universities become imperative, as this will equip students with digital skills needed for post-school labour market.

Keywords: Health, Covid-19, Higher Education, 4IR, Remote Learning, Personal Study, Peer Engagement

INTRODUCTION

Education has been generally identified as one of the key drivers of economic growth and development of any economy. The place of higher education, which comprises of all forms of education beyond the compulsory secondary level education, these include technical and vocational training, college of education and universities, in sustainable economic and social development cannot be overemphasised. According to World Bank (2017), higher education can make an important contribution to building a stronger society, ending extreme poverty, and boosting shared prosperity. Equally, since knowledge plays a growing role in the global economy by driving economic growth and productivity, higher education which is a central point of knowledge and its application therefore serves the community by contributing to knowledge generation through research for innovation, and advanced skills. Organisation for Economic Co-

operation and Development (OECD) (2013), also pointed out that raising skills hold the key to higher living standards and well-being. Investing in knowledge creation and enabling its diffusion is the key to creating high-wage employment and enhancing productivity growth, these are achieved through post-secondary education or higher education. Literature suggests that countries with a greater proportion of educated graduates in the labour force have greater labour productivity and increased capacity to adapt technology and to innovate (Altbach 2013; Bloom et al. 2014).

Over the years learning and teaching at a higher institution of learning has been massively based on, on-campus face-to-face interaction with instructors. The contact mode of learning is often considered to be teacher-centered with passive learning by students, such that the instructor largely influences the dynamics in and of the classroom or the lecture period (Paul and Jefferson, 2019). According to Paul & Jefferson (2019), the traditional modality of learning and teaching support real-time face-to-face instruction, does not depend on ICT devices and networked systems that could be faulty in the process of learning, promotes student-student interaction and socialization that is achieved through discussions that occurs before and after class, collective learning, and organic student-teacher bonding (Roval & Jordan, 2004). Besides, the traditional on-campus models where students come for lectures can be viewed as a leveler as it promotes equal access to tangible (e.g. libraries, electricity, water, health centre, sports and recreation centres) and non-tangible infrastructure and facilities (internet facility, digital library, plagiarism software facility, digital publication, analytical tool or software) that enhance learning.

However, a learning process in higher education subsector like all other educational sectors and economic sectors has been greatly altered or affected by the Covid-19 pandemic, which is considered as a health shock. Shocks are unexpected events that are disruptive and negatively affect every area of life and welfare. These shocks could be individualistic, localized or global. It could be minimal or massive as well, and its impact could last for a short or longer period of time. On March 11, 2020, the World Health Organization characterized COVID-19 as a pandemic. Covid-19 pandemic is a global health shock that has been devastating to every segment of global and individual economies of the world. The shock caused unprecedented disruptions to global trade, travel, and tourism; stress in global financial, reduced demand and supply of goods and services, and at the same time led to a reduction in employment (World Bank, 2020). The educational sector has not been left out in this devastating effect. The effect of Covid-19 pandemic on education is massive and multidimensional, affecting both use and supply of educational services at all levels (World Bank, 2020). It is in line with the aforementioned that aims to explore students' experiences with respect to selected higher education demand dynamics and the factors that enhance learning at higher education during Covid-19 pandemic remote learning. Specifically, the effect of Covid-19 pandemic on experiences of personal study, peer engagement and learning resources was examined.

REVIEW OF LITERATURE ON HIGHER EDUCATION, HEALTH SHOCKS AND COVID-19

There is an abundance of literature that have identified and discussed various factors that enhances or inhibits demand side of higher education dynamics including students' academic performances. These factors include socio-demographic, personal, environmental and economic factors among

others. Also, it is unarguable that individual and global health shocks affect learners' educational outcomes and factors that enhances it at all levels of education be it primary, secondary or post-secondary levels. A brief review of the factors that affects academic performance and specifically impact of health shocks on factors that enhances and some selected educational outcomes is presented in this section.

Factors that Affects Students' Performance

Evidences from literature reveals that outcome of higher education service used by its consumers determined influenced by various diverse factors which include, demographic characteristics e.g. age and gender (Cotti et al. 2013), socioeconomic characteristics of family e.g. parent education, occupation and income (Dockery et al., 2016; Sothan, 2019; Lim, 2015), past academic records and performance, behavioural and psychological status (MacCann et al., 2020), learning environments and access to learning facilities e.g. residence, internet facility, class size etc. (Sovacool & Vera, 2014; Wagner et al., 2017), funding (Wildschut et al., 2020; Naidoo and McKay, 2018), communication skill and proficiency in English Language (Priyadarshana & Kumari, 2020; Sothan, 2019;), attendance in class (Priyadarshana & Kumari, 2020), study habit (Sothan, 2019; Andrietti & Velasco, 2015; De Paola & Giola, 2017), field of study, students' integration and peer interaction among others. Evidences from literature however show that the effects of these factors on academic performance like retention, completion or drop out and academic grade are inconsistent.

Effect of Health and Health Shocks of Higher Education

Personal and public health shocks like the Covid-19 pandemic has an effect on the use, supply and outcome of educational services. The effect could be massive and multidimensional, the extent of effect further depends on the coping capability and strategies employed. According to Matingwina (2018) and Shaw et al., (2015), students' health status has links with enrolment, class attendance, poor levels of concentration, academic grades, retention, and dropout. In a study conducted by the American College Health Association in 2015, stress; sleep difficulties; anxiety; and upper respiratory tract infections were identified by college students as health conditions which had negatively impacted on their academic performance. Using a logistic regression, Grøtan et al., (2019) established a strong association between symptoms of mental distress, academic self-efficacy and study progress by showing that students who reported severe mental distress were four times as likely to report low academic self-efficacy and twice as likely to report delayed study progress compared to students reporting few or moderate symptoms of mental distress. Toscano-Hermoso et al., (2020) from their study found that sleep disorders correlate with difficulties in achieving academic success. Oduwaiye et al., (2017) also established the existence of significant between level of personal stress, interpersonal stress, environmental stress, achievement stress and academic performance. Stress is known cause of psychological problems such as loss of appetite, memory loss, absent-mindedness, depression, frustration, nervousness and blood pressure which are common among human including students (Oduwaiye et al., 2017). Equally, indirect health shock in the form of death of parents or financial sponsor stimulates an economic shock which could lead to poor performance or eventually drops out of financially needy students.

With respect to the Covid-19 pandemic, loss of school time due to closure of learning facilities, increased drop outs rate, also some students were affected through the death of parent and job loss, cut in education investment, unbalanced curriculum, lower graduation rate among several others are part of the effects of this health shock on education (World Bank, 2020). Covid-19 shock affected all elements of traditional higher education learning and necessitated a shift to alternative learning measures, which is a massive adoption of off-campus, none contact and none face-to-face learning. According to UNESCO (2020), online education has been considered to be a solution to the disruptions caused by Covid-19 pandemic. Without any doubt, Covid-19 pandemic has inevitably launched the educational sector into the Fourth Industrial Revolution. The Fourth Industrial Revolution (4IR) can be traced to massive evolution and application of technology. According to (Xing 2006), higher education teaching and learning in 4IR involves, digital learning, Wearables Assisted Teaching, Learning, and Training, embrace massive open online courses (MOOCs), Cultivating Innovative Talent and Generalize Blended Learning. Higher education in this era is interdisciplinary, has virtual classrooms and laboratories, virtual libraries and virtual teachers. Covid-19 pandemic and the inevitable adoption of 4IR technologies by higher education institutions have a certain level of effect on educational pedagogy and other factors that enhance teaching and learning which include personal study, student engagement, learning environment, student engagement, access to learning facilities and tools, peer support, active learning activities among others.

RESEARCH METHODOLOGY

This study adopts a qualitative research approach. A qualitative research method is used to narratively understand people's experiences, attitude and behaviour to and belief regarding an issue under consideration Pathak et al., (2013). Consequently, a structured open-ended questionnaire was used in obtaining non-numeric information and narratives of student experiences with respect to specific factors that enhance learning and academic outcome. The questionnaire document was sent through WhatsApp and email to identified students. A total of ten students from a selected university in South Africa participated in filling the questionnaire. The selection of the respondents was done by convenience sampling, because the students were easily available and the researcher having established informal interaction with the identified students. The students were duly informed about the purpose of the study and consented to participating in answering the questions.

DISCUSSION

The findings discussed in this section are based on information obtained from participants and themes identified with respect to the aim of the study.

Personal Study

One of the personal factors that enhance students' learning and promotes positive learning outcome is private study habit. Study habit is the way and manner students' plan their private academic

reading separates from formal lecture hours in order to master specific course content (Ahmed et al., 2018). It is the amount of time student spends on his or her study outside class session (Sothan, 2019). Generally, this study habit can either be good or bad. Several studies have found significant impact of private or self-study on academic performance in terms of better grades and graduation rate of university study (Sothan, 2019; Andrietti & Velasco, 2015; De Paola & Giola, 2017). The ability of students' private study to enhance academic performance is further influenced by their time management skill and technique, environmental condition. However, Covid-19 shock which necessitates closing down of schooling facilities and activation of online classes from students' home residences have some extent of the impact on the ability of students to engage in effective and efficient personal study. For example, three respondents corroborated the view their private study pattern was not the same at it was when the schools were operating. Some of the respondents have this to say about personal study time during the lock-down;

Student 4:
"It was less than normal"

Student 6:
"I usually spend less hours than before"

Student 7:
"The time I spent on person study during lock-down was less than normal"

Though this is not unexpected, however, the inability to engage in personal study is further compounded with the challenges relating to living or environmental condition. This is consistent in the study of Realyvásquez-Vargas et al., (2020) which established that noisy environment at home during Covid-19 period disturbs, distracts and hindering concentration during online classes thereby leading to poor academic performance. One of the benefits of residential infrastructure provided by higher educational institution is the enhancement of private study while on campus. Personal study in this case is affected by living conditions with respect to the type of residence, number of people in the residence, and access to infrastructure like electricity and internet facility. With respect to structure of residence, students' living in residential building that do not make provision for privacy and library will find it mostly impossible to engage in personal study during Covid-19 pandemic. This is buttressed by the narration of student extracted from the interview:

Student 1:
The environment I live in is not favourable for personal study because and that is mostly because of network issues and the fact that I don't have I am sharing a room with my siblings.

No I don't have a separate room for studying and parents sometimes don't understand this whole studying thing they just send you to do something for them while you are still studying and you obviously can't say no, and there is also the issue of children who make a lot of noise and I personally have got my own child who sometimes just comes in and wants something from me or wants to sit with me while I'm still studying.

it's the poor network.

Student 2:
No, it has poor network and no privacy, I share a room with my sister, it a busy house where you spend lots of time in talking rather than in books.

Student 3:
Though I have a room to study in, yet where I stay is not favourable to study. I stay in Bloemfontein and it's a township set up. It gets really chaotic and disruptive almost all the time. During my high school days my father had to take me to the library after school because the environment is noisy.
People (children and adults) affect my personal study in a negative way. Whilst trying to balance school work and chores I also need to try to keep them quiet so I don't have a favourable environment to study.

Similarly, the type and the number of individuals in the place of residence in terms of non-educated oriented persons, presence of minors, will inhibit private study time. Likewise, having limited access to infrastructural facilities like poor network coverage, and lack of electricity which is more prevalent in the rural setting will not aid a good private study time of the students. Without any doubt a poor living condition is detrimental to learning through online means, as it is observed that coming over to campus for face to face classes is a means of escaping the hash and poor living conditions of many student coming from a rural environment. This is in line with study of Daraku & Hoxha (2020) which concluded that limited availability of space at home and distraction from family members during the lock-down were major challenges facing students' online learning.

Student-Student Peer Engagement

Another, identifiable factors that enhance tertiary education learning, experiences and academic performance is Student Engagement. It involves a dynamic interaction between and among stakeholders (students', educators, service staff and institutions interact) within an institution such that an enriching tertiary education experience is produced (Kahu 2013; Junco 2012). According to Boulton et al., (2019) student engagement can be considered to mean the behaviour, commitment and purposeful effort expended by students towards all aspects of learning, including both formal and informal activities academic activities. Bowden et al., (2019) defined student engagement as a student's social, cognitive, emotional, and behavioural investments made when interacting with their tertiary institution and its focal agents (such as peers, employees and the institution itself). Empirical evidences from literature shows that student engagement does have positive effect on several academic, personal and social outcomes which include increased retention rate, high impact and lifelong learning, curricular relevance, enhanced institutional reputation, increased citizenship behaviours, student perseverance, work-readiness, social and personal growth and development, transformative learning, enhanced pride, inclusiveness and belonging and improved student well-being (Khademi et al., 2018; Khademi & Kamelifar 2018; Zepke et al., 2014; Kahu 2013). For example, from the study of Fredricks et al., (2016), it is noted that high engagement is consistently related to academic outcomes such as course grades and achievement test scores. The behavioural engagement subset of student engagement is the degree to which students are actively involved in learning activities (Kahu, 2013; Fredricks et al., 2004). The indicators for this sub-student engagement include time and effort spent participating in

learning activities (Lam et al., 2012; Kahu, 2013; Lester, 2013; Fredricks et al., 2004) and interaction with peers, faculty, and staff (Kahu, 2013).

However, the contemporary students' in Higher Education (HE) are in a very different environment from that enjoyed by previous generations especially with the advancement in and the massive adoption of digital learning. The current global pandemic equally makes digital or remote learning unavoidable, and this has some levels of impact on peer to peer interaction which is one of the beauties of face-face on campus learning setting. It is right to say that contact learning on campus is a place for building friendship and facilitating authentic social networks. Covid-19 pandemic has led to the loss of usual daily routine as well as reduced social and physical contact with others (including the social-distancing measures), this often trigger numerous negative emotions like frustration, boredom, anxiety, confusion, and anger (Aristovnik et al., 2020). Responses from all the participants indeed indicate that they communicate with their peer through various social media at their disposal including WhatsApp, Facebook, Instagram and Twitter, where they have several discussions ranging from academic, socials and fashions. However, the responses show that their interaction with their peer has been less than normal during the Covid-19 period compare to when the school was operating, and they really desire to be back on campus.

Student 1:
The interaction with other peers or colleagues during this covid 19 period is less than normal than compared to when school was operating. When we interact we use WhatsApp, when we interact, we discuss and share academics. Yes, we do discuss academics on WhatsApp groups.

Bergland (2016) notes that there is something paramount about face-to-face interactions that is crucial for maintaining friendships, which the Covid-19 pandemic has taken away from students. Social media platforms like Facebook, Twitter, and Instagram may aid interaction with many more people at the same time, yet it appears that these social network connections do not really translate into stronger social bonds with close and authentic friends. In essence, as affirmed by Dunbar (2016) it may imply the fact that real (as opposed to casual) relationships require at least occasional face-to-face interaction to maintain them. Without doubt, one of the benefits which traditional contact-learning offers for university students' is the increasing promotion of peer engagement and social integration which might have lasting benefits beyond the university environments.

Beside the effort student are making to keep engaging with their peer during the lock-down, they have been however unable to cope with remote peer engagements. For example, three of the participants lamented their inability to cope with personal remote study and peer engagement, such that the tone used by respondent is that of frustration and anxiety.

Student 1:
I'm not coping well because it's almost impossible to study here mostly because I can't attend even a single class due to these network issues".

Student 2:
Not good at all I think this thing of self-study isn't working for me".

Student 5:
I am not coping at all, I wish to go back to campus and things go back to normal

The inability to cope can be observed to be related to poor study skill, low motivation, poor concentration, poor internet facility and perhaps problematic internet used and addiction. Motivation to learn is a construct that covers a broad range of skills needed for study, including: self-efficacy, learning strategy, intrinsic value, self-regulation and test anxiety (Truzoli, et al., (2020). Equally, high levels of problematic internet connection increases risk of lowered motivations to study, as it has links with loneliness, anxiety and depression (Morrison and Gore, 2010; Lai et al., 2015; Ostovar et al., 2016; Romano et al., 2017; Stavropoulos et al., 2017), and, hence, lower actual generalized academic performance due to a number of consequences of problematic internet used.

Learning Tool Access

The third factor enhancing the academic success of higher education students considered in this study is access to learning tool or infrastructural facilities. Tokan & Imakulata (2019) alluded that quality in higher education is not only determined by lecturers, but also facilities and infrastructures. According to Tayo et al., (2012) infrastructures are the totality of all tangible and non-tangible infrastructure and facilities that goes into education in order to facilitate teaching and learning. These tangible infrastructures include but not limited to classrooms, lecture theatres, laboratories, libraries, electricity, water, health centre, sports and recreation centres, ICT, printers, machines and furniture, lecture room, laboratories, Library and Digital resource centre, facilities such as libraries, hostels, shuttle buses, cafeterias, clinics, sports and cultural facilities, prayer room, security guards, computer labs, language labs. The intangible infrastructures include internet infrastructure, Digital Library, Plagiarism software facility, Digital Publication, analytical tool or software. These infrastructures are necessary because they provide a conducive environment for learning which also motivates students' involvement in academic activities. However, not only is the availability of these infrastructure necessary for academic progress and excellence but access to them are equally imperative.

On access to learning tools and infrastructures, responses form the students interviewed indicate that a tangible learning tool specifically personal computer is not a problem. However, from their responses there is evidence of lack of access to ICT (faulty personal computers), technology or telecommunication infrastructure (in terms of poor internet connection or unreliable internet access and analytical software) and technical support which are considered as intangible tools. For example, three of the participants in this research explained,

Student 2
I didn't have a personal computer until I bought it this month. I do have data but still have a poor internet connection.

Student 4:
I have access to all the tangible and intangible infrastructure, my access to internet is good.

my computer is old so I struggle with it sometimes, also with academic software it was very hard for the IT department to assist me when I had trouble installing SPSS and I still don't have the program installed even though I really need it for research.

My access to internet is good but with the universities data allocation I have to always be vigilant of the amount of data that I am using. When data is finished I struggle to complete research on assignments.

This view was however not corroborated by another participant (student 9) who said,

"There is no internet access at all, it's poor, too much struggling with internet access where I live".

The fact that access to tangible resource and tools is not a problem is based on the effort of many institutions in South Africa in making sure their respective students' have access to PCs, PCs were purchased for students' during the lock-down and sent to various students' in order for them to access remote learning effectively. It is clear to say that the availability of PCs for remote learning is made possible because it is within the capacity and the ability of the respective institutions. The responses on access to the internet connection are not unexpected, the challenge is a major concern, and which seems to be affected by geographical distribution. While those living in urban or peri urban areas like student 4 will in no doubt experience a better quality of internet facility and opportunities, those in the rural area will be deprived in this learning resource. A similar situation was noted by Mpungose (2020) where students examined reported their inability to do submit assignments by due date due to no internet access.

This bias quality of internet provision by internet service providers is as a result of differences in prevalence in and potential of economic activities and benefits. Specifically, ISPs will supply better internet facility to urban areas where economic activities are higher and where they could recoup their profit accordingly compared to rural areas. The unequal access to internet connectivity which is beyond the capacity of institutions is one of the elements of a digitally divided society, and it is not experienced in South Africa only but the same is reported in the Philippines, Uganda, and India (Mayende et al., 2014; Basaza et al., 2010). With low, poor or no internet connectivity, live lectures and downloading of some learning materials become a difficult thing (Teras et al., 2020). In this situation, many students' in rural areas could be left behind regarding higher educational training. Besides, the issue of the quality of internet facility, shortage of water supply, load shedding, was mentioned by participants of the research. This is revealed from the response of two participants in the extract below:

Student 4:
Well I do have access to electricity but we have got shortage of water

Student 6:
We can't study without electricity our phones and laptops need to be charged but yet we are experiencing the Load shedding issue of which I end up to studying.

Studies (Sovacool & Vera, 2014; Wagner et al., 2017) have reported links between availability of infrastructures link water and electricity and education. Availability of electricity and electric lighting is imperative for education being that creates conditions conducive to studying

and aiding extended study hours, powering devices or IT services that enable learning. While electricity is adequately available during pre Covid-19 period for university students' usage, it however poses a challenge for them when they are at home especially with homes who are economically disadvantaged and have to often ration electricity usage. Equally, with South Africa is recently experiencing power outages and unequal load shedding, the ability of students' and educators to use learning and teaching resources from home becomes limited if the tools are not well charged. These experiences are contrary to what is obtainable when the schools were in operation, in that higher institution usually have backup automatic electrical generation for students on campus when there are power outages. Indeed, effective learning in threatened with continuous remote learning due to Covid-19 if necessary infrastructures are not out in place to support home based- learning.

CONCLUSION

The effects of Covid-19 pandemic is global, diverse, massive and it cuts across all sectors of an economy. In the higher education sector, the health shock, has affected the mode of teaching and learning, forcing the inevitable and indispensable adoption of remote learning and 4IR technologies. This remote learning has consequently affected teaching and learning pedagogy, factors that enhance students' learning and several learning outcomes. This study applied a qualitative methodology to access university student experiences with respect to how remote learning has affected three of the factors that enhance learning: personal study, peer engagement and access to learning tools. Generally, considering the various experiences of students in this study, and most especially the unconducive learning environment during remote learning, it is posited that on-campus, face to face higher education learning remains a tool for acquiring necessary post-school higher education skills in South Africa. Hence, in view of the need to leave no student behind in terms of higher education training, absolute adoption of digital learning or 4IR technologies by rural based universities is currently impracticable. The existence of inequalities and societal imbalances in different forms; economic inequality, digital inequality and geographical inequality will make absolute adoption of remote learning unrealistic. Therefore, since face to face learning is indispensable, a massive adoption and implementation of blended or hybrid teaching and learning techniques and on-campus digital training by rural based universities becomes imperative, as this will equip students with digital skills needed for post-school labour market. Moreover, on the part of the government, there should be strengthening of policies and institution that will promote bridging of various inequalities existing in the South Africa spaces including the internet or digital inequality.

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