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Assessment of uptake ICTs and other interventions to deliver online learning during the covid-19 pandemic: the case of institutions of higher learning in Zambia

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Abstract

The study sought to assess the uptake of Information Communication Technologies (ICTs) for online learning in institutions of higher learning during the novel corona virus disease (COVID-19) pandemic. In March 2020, Zambia announced its first two clinically confirmed COVID-19 cases. In the same month, the government announced the indefinite closure of all schools including institutions of higher learning in a bid to curb the spread of the disease. Forthwith, statutory instruments Nos.21 and 22 were issued under the Health Act to guide the manner the pandemic was to be tackled. In a bid to ensure continued learning, most institutions of higher learning had to discontinue face-to-face pedagogies and switched to virtual platforms of learning. The use of ICT platforms and tools for online teaching and learning has become a competitive tool for institutions for higher learning and industry as a whole. The study was designed in such a way as to asses a preparedness of institutions of lecturers to deliver lectures and learners to receive lessons using online platforms. It also sought to determine effectiveness of carrying out assessments and evaluate the challenges delivering lectures using online platforms. A total of five (5) higher learning institutions were purposively sampled from the Higher Education Authority (HEA) database. The respondents from these include administrators of institutions, lecturers and students and data were collected through interviews and questionnaires. A mixed method approach was employed. A total of 765 respondents were sampled but 473 were actually enumerated resulting in a percentage response rate of 61.8%. The data was analysed quantitatively and qualitatively. Results indicate that, higher institutions were not very ready to deliver lectures online due to inadequate investment in ICT infrastructure; lack of and/or unstable internet connectivity; power outages; inadequate ICT delivery skills coupled with lecturers and student perception pertaining to online delivery. Lecturers were not prepared and, in some cases, were unable to fully utilise ICT for online teaching and evidenced by a mean value of 2.65 which fell in the interval 3.5 to 4.2 revealing a notable “Bad” overall experience justified by a higher percentage distribution of 55.1%. This indicate that lecturers’ capacity to use gadgets was reasonably bad at 55.1%. It is recommended that higher learning institutions invest heavily in ICT infrastructure and train lecturers and other support staff

Key terms: ICTs, Online learning, Infrastructure, COVID-19, Delivery skills

1. Introduction

COVID-19 pandemic has created panic, pandemonium and sent shock waves around the world in terms of its deadliness and its massive disruption of every facet of human existence, particularly to the education system. With the introduction of statutory instruments Nos.21 and 22 under the Health Act to guide the manner the pandemic was to be tackled, most institutions of higher learning had to discontinue face-to-face pedagogies and switch to virtual platforms of learning using ITCs as a way to ensure continued learning. E-learning is defined as learning that makes use of Information and Communication Technologies (ICTs). The incorporation of technological resources and innovative education strategies has transformed the teaching and learning processes. Previous studies have shown various e-learning and online learning tools that are effective for teaching and learning in the fields of health, agriculture, business just to mention a few. With this sudden shift away from the classroom in many parts of the globe, some are wondering whether the adoption of online learning will continue to persist post-pandemic, and how such a shift would impact the worldwide education market.

2. Literature Review

It is a fact that the COVID-19 pandemic has adversely affected various institutions and industries globally. The higher learning institutions and industry in Zambia have equally not been spared thereby forcing them to change and/or transform curriculum towards online learning format. According to Chavez, et al., (2021), ICTs have become increasingly important in our daily lives and in our educational system. It is equally a fact that there is currently a growing demand from educational institutions to use ICTs to provide the needed skills and knowledge that students need for the digital age (Knezek and Christensen, as cited in Chavez, et al., 2020). Shafika, (2007) undertook a similar survey in Zambia, and observed that the penetration levels of ICTs in Zambia's education institutions were low, with those schools that are equipped mostly utilizing second-hand and refurbished computers.

Almazova, et al., (2020) observed that a large number of studies have shown that the integration of ICTs in teaching by lecturers in higher education institutions is also influenced by organizational factors and attitudes towards technology. It can therefore be inferred that ICTs are major drivers of higher learning institutions. Strategies are required from both individuals and organisations to adequately interface with ICT systems and platforms in their daily operations. It is indeed a strategic resource for competitive advantage, in the education industry particularly where pedagogies require online modes of delivery as opposed to face-to-face.

2.1 Scope of the Study

The study targeted both public[1] and private[2] learning institutions registered with the Higher Education Authority (HEA). This provided the sampling frame from which participating institutions were purposively sampled. The full list of institutions is available on the HEA website.[3]

[1] https://www.hea.org.zm/index.php/public-heis

Table 1: Target participants

Respondents	**Public**	**Private**	**Total**
Institutions	3	3	**6**
Administrators (Three from each institution)	9	9	**18**
Lecturers (50 from each institution)	150	150	**300**
Students (100 from each institution)	300	300	**600**
Total respondents	**459**	**459**	**918**

3. Methodology

The study purposively sampled an equal number of private and public institutions and targeted to enumerate a total of 918 participants broken down as follows: 18 Administrators, 300 lectures and 600 students. Table 1 above shows the targeted participants of the study.

3.1 Sampling Techniques

The sampling technique that was used for this study to reach out to lecturers and students was convenience sampling. The technique was opted for because it simplified the process of reaching out to respondents as the data collection period was marred with COVID-19 challenges. Lecturers and students were conveniently reach in a bid to maximise the data collection. This study was performed from May to 2021 to March, 2022.

Study participants were the first, second and third-year of undergraduate students on similar programmes of study from identified universities in Zambia. The online questionnaire was administered in semester 2 of 2021 and partly in semester 1 of 2022. Respondents were strongly encouraged to fill out the questionnaire but their participation remained voluntary. The name and other personal information of the study participants were protected.

4. Data Presentation and Analysis

Data collection was done through structured online questionnaires to collect information from lecturers and students respectively while discussion guides were used for the qualitative assessments involving interviews with administrators. Online questionnaires were used and this allowed for uploading of data onto a central database in real time. One private university declined to participate. This effectively reduced the target number of participants from 918 to 765. A total number of 473

[2] https://www.hea.org.zm/index.php/registered-private-heis2
https://hea.org.zm/private-heis/

questionnaires and interview guides were received and verified representing a rate of 61.8% responsiveness as indicated in Table 2 below:

Table 2: Participants responsiveness

Respondents	**Planned**	**Revised**	**Actual**	**Response rate**
Administrators	18	15	13	86.7%
Lecturers	300	250	69	27.6%
Students	600	500	391	78.2%
Total	**918**	**765**	**473**	**61.8%**

Though the overall response rate of 61.8% is acceptable, the response rate for lecturers was poor signifying low commitment to issues of research and a sign of poor research culture. In terms of Gender representation, 187 female and 204 male students participated in the survey, whereas 18 female and 51 male lecturers participated in the survey respectively. This represented a proportion of 44.6% to 55.4% female to male participation. However, the proportions of males and females may not represent the levels of involvement of males and females in the uptake of ICT during COVID – 19 pandemics in the institutions. Data was analysed using STATA and SPSS from the quantitative point of view, content analysis on aspects of qualitative in nature and word processing techniques.

a) Provision and usage of Smart Devices for eLearning by Universities

The study sought to know whether lecturers were provided with internet enabled devices/gadgets required for eLearning. Out of the 69 respondents, 55 (79.7%) indicated to have been provided with internet enabled devices required for eLearning. A variety of gadgets were provided and included smartphones, desktops, laptops, dongos, Mi-Fi's, routers and other similar devices. With regards to preferred gadgets/devices, Table 3 below depicts the desired and undesired gadgets/devices for conducting online classes.

Table 3: Gadgets Preferred for Conducting online Classes

	Preferred for conducting online classes	**Not Preferred for conduction online classes**
Laptop	88.4% (n=61/69)	11.6% (n=8/69)
Tablet	30.4% (n=21/69)	69.6% (n=48/69)
Smartphone	18.8% (n=13/69)	81.2% (n=56/69)
Desktop	15.9% (n=11/69)	84.1% (n=58/69)
Other	2.9% (n=2/69)	97.1% (n=67/69)

Table 3 above indicates that Laptops are the most preferred gadgets by lecturers with 88.4% preference. Similarly, Desktops are the most disliked with 84.1% followed by Smartphones with 81.2% and Tablets with 69.6%.

b) Experience in the Usage of ICT to conduct classes and assessments

A 5-point Likert Scale was used to assess lecturers experience in the usage of ICT to conducting online classes and assessments as in 1- for Excellent, 2 – for Very good, 3 – for Good, 4 – for Bad, and 5 – for Very bad. Responses were analysed and the percentage distribution determined as in Table 4 below.

Table 4: Analysis of Usage of ICT to Conduct online classes and assessments by Lecturers

Level	Scale	Interval	Percentage distribution
Excellent	*1*	1 - 1.8	10.1%
Very Good	*2*	1.9 - 2.6	26.1%
Good	*3*	2.7 – 3.4	5.8%
Bad	*4*	3.5– 4.2	55.1%
Very Bad	*5*	4.3 - 5	2.9%

A mean value of 2.65 was computed and used to determine the experience levels. A mean value of 2.65 fell in the interval 3.5 to 4.2 which reveal a notable “Bad” overall experience justified by a higher percentage distribution of 55.1%. This indicate that lecturers’ capacity to use gadgets was reasonably bad at 55.1%

c) Structuring and managing online classes

The study sought to know how online classes were formatted and conducted. It also sought to know student attendance levels, participation and contribution and duration of online classes. The format of online classes was rated as Live, Pre-recorded, uploading reading materials or any other format used as indicated in Table 9 below.

Table 5: Format of online classes by lectures

	Platform used to attend to queries	Platform not used to attend to student queries
Uploading reading materials via the Website or email or WhatsApp etc.	82.6% (n=57/69)	17.4% (n=12/69)
Live virtual (online) classes	75.4% (n=52/69)	24.6% (n=17/69)

Pre-recorded virtual (online) classes	37.7% (n=26/69)	62.3% (n=43/69)
Other (specify)	5.8% (n=4/69)	94.2% (n=65/69)

It is discernible from the Table 5 above that 57 lecturers representing 82.6% uploaded reading materials using either the Website, Email or WhatsApp. Nonetheless, Live virtual and pre-recorded virtual online classes were rated at 75.4% and 37.7% respectively. Effectively, of the pre-identified formats, pre-recorded virtual was the least used at 62.3% rating. From the results observed there is compelling evidence that the most employed format for online classes was uploading reading materials via the website, email and WhatsApp given the higher number of respondents who confirmed to structuring their online classes in that format. To determine the frequency of lecturers conducting online classes with their students, 62.3% (n= 43) of the lecturers stated that they conduct online classes as per timetable, 15.9% (n=11) stated that they conducted online classes as agreed with the students involved, 10.1% (n=7) stated that they did it once a week while 8.7% (n = 6) stated that they did it daily and 2.9% (n=2) stated that they conducted online classes fortnightly. There is compelling evidence to conclude that most lecturers conducted their online classes asper timetable

Level	**Scale**	**Interval**	**Percentage distribution**
Strongly Agree	*1*	1 - 1.8	14.5%
Agree	*2*	1.9 - 2.6	11.6%
Neutral	*3*	2.7 – 3.4	40.6%
Disagree	*4*	3.5 – 4.2	26.1%
Strongly Disagree	*5*	4.3- 5	7.2%

Table 6: Perceptions on Online Classes

A mean value of 3.00 was determined and fell in the range 2.7 to 3.4 exhibiting compelling evidence that most respondents had a neutral perception of the structure of online classes compared to face-to-face.

d) Skills since online classes.

A 5 - point Likert scale was used to solicit for information from respondents regarding their perception as to whether lecturers' technical skills (email/internet apps) has increased since starting online classes.

Level	**Scale**	**Interval**	**Percentage distribution**
Strongly Agree	*1*	1 - 1.8	27.5%
Agree	*2*	1.9 - 2.6	43.5%

Neutral	*3*	2.7 – 3.4	23.2%
Disagree	*4*	3.5 – 4.2	4.3%
Strongly Disagree	*5*	4.3- 5	1.4%

Table 7: Perceptions on Technical skills

A mean value of 2.09 was determined and fell in the range 1.9 to 2.6 exhibiting compelling evidence that most respondents agree that since starting online classes, their technical skill regarding ICT matter have increased. This is represented by 43.5% of respondents.

e) Perception Regarding Student Participation

A 5 - point Likert scale was used to solicit for information from respondents regarding their perception as to whether student participation is low during online classes in comparison with regular classroom learning.

Level	Scale	Interval	Percentage distribution
Strongly Agree	*1*	1 - 1.8	33.3%
Agree	*2*	1.9 - 2.6	40.6%
Neutral	*3*	2.7 – 3.4	13.0%
Disagree	*4*	3.5 – 4.2	11.6%
Strongly Disagree	*5*	4.3- 5	1.4%

Table 8: Perceptions on Students Participation during Online classes.

A mean value of 2.07 was determined and fell in the range 1.9 to 2.6 exhibiting compelling evidence that the majority of lecturers agree that student participation is low during online classes in comparison with regular face-to-face classes. This was represented by 40.6% of the respondents.

f) Perception Regarding Usage of Online Platforms

A 5 - point Likert scale was used to solicit for information from respondents regarding their perception as to whether the use of online platform such as Emails, WhatsApp and other platforms help lecturers stay in touch with students more regularly than face-to-face learning.

Level	Scale	Interval	Percentage distribution

Strongly Agree	*1*	1 - 1.8	26.1%
Agree	*2*	1.9 - 2.6	37.7%
Neutral	*3*	2.7 – 3.4	15.9%
Disagree	*4*	3.5 – 4.2	14.5%
Strongly Disagree	*5*	4.3- 5	5.8%

Table 9: Perceptions on the Usage of Platforms

A mean value of 2.36 was determined and fell in the range 1.9 to 2.6 exhibiting compelling evidence that most lecturers agree that the use of online platform such as Emails, WhatsApp and other platforms help them stay in touch with students more regularly than face-to-face learning. This represented 37.7% of the respondents. Effectively 63.8% of the respondents agree to this statement with 15.9% being neutral and 20.3% disagreeing to the statement.

g) Internet connectivity

Students were asked to state whether it was important to have internet connectivity all the time. A five-point Likert scale was used to determine student perceptions regarding this matter. It was evident from the analysis that 80.3% (n=314) of the students strongly agreed that it is important to have internet connectivity all the time; 14.3% (n=56) agreed; 2.6% (n=10) stated that they were neutral while 2.0% (n=8) disagreed and 0.8% (n=3) strongly disagreed. Effectively, 94.6% of the students agreed that it is important to have internet connectivity all the time as in Table 19 below:

Level	**Scale**	**Interval**	**Percentage distribution**
Strongly Agree	*1*	1 - 1.8	80.3%
Agree	*2*	1.9 - 2.6	14.3%
Neutral	*3*	2.7 – 3.4	2.6%
Disagree	*4*	3.5 – 4.2	2.0%
Strongly Disagree	*5*	4.3- 5	0.8%

Table 10: Importance of Internet Connectivity

The strongly agree level of importance is supported by an observed mean value of 1.5 that fell in the interval 1 – 1.8 signifying overwhelming evidence that students who participated in the survey feel that having internet connectivity all the time is very important.

h) Social media and its impact

Social media has been widely used to engage with a cross section of society. Nonetheless, of the five commonly used Social Media Sites namely Facebook, WhatsApp, Twitter, Instagram and LinkedIn,

all the 391 respondents acknowledged being on Facebook and this translated into 100% utilization of the platform by students. From the analysed results we can conclude that the most preferred and utilized social media site from the listed ones is Facebook with all respondents attesting that it is highly employed in engagement with people. In terms of impact, a 5 - point Likert scale was used to as depicted in Table 12 below:

Level	Scale	Interval	Percentage distribution
Strongly Agree	*1*	1 - 1.8	61.1%
Agree	*2*	1.9 - 2.6	30.4%
Neutral	*3*	2.7 – 3.4	5.4%
Disagree	*4*	3.5 – 4.2	1.5%
Strongly Disagree	*5*	4.3- 5	1.5%

Table 11: Use of Facebook and WhatsApp to Aid interaction.

A mean value of 1.52 was observed and fell in the interval 1 to 1.8 signifying that there is notable evidence that the majority of students strongly agree that social media such as Facebook and WhatsApp help them stay in touch with course mates, lecturers and helps them to be updated on current news all the time. Effectively, 91.5% agree to the assertion.

Table 12: Disruptive and destructive nature of Smart Phones.

Level	Scale	Interval	Percentage distribution
Strongly Agree	*1*	1 - 1.8	13.0%
Agree	*2*	1.9 - 2.6	9.7%
Neutral	*3*	2.7 – 3.4	37.1%
Disagree	*4*	3.5 – 4.2	23.5%
Strongly Disagree	*5*	4.3- 5	16.6%

However, and based on the mean value of 3.20, which fell in the interval 2.7 to 3.4, it can be concluded that the aspect of disruptive and distraction of smart phones to academic work is neutral.

i) Students assessment on institutions readiness to deliver lectures online.

Students were asked whether they regard their institutions fully equipped and prepared to deliver lectures online in regards to availability of internet resources and connectivity. A 5 - point Likert scale was used to determine the range in which the mean fit and the level of consensus from the student who took part in the survey as in Table 13 below.

Table 13: Students Assessment on Institutions readiness to Deliver lectures online

Level	Scale	Interval	Percentage distribution
Strongly Agree	*1*	1 - 1.8	21.2%
Agree	*2*	1.9 - 2.6	30.9%
Neutral	*3*	2.7 – 3.4	17.1%
Disagree	*4*	3.5 – 4.2	14.3%
Strongly Disagree	*5*	4.3- 5	16.4%

Analysis of the results revealed a mean value of 2.3 which fell in the interval 1.9 – 2.6 revealing that majority of students who took part in the survey agree that their institutions are fully prepared to deliver online classes.

j) Student preferred mode of Lecture delivery and Preferred mode of Examination.

Students were asked which modes of lecture delivery they preferred using 5 options namely: face to face lectures, zoom online lectures, slides put on portal, email communication and portal interface. Results from the survey reveal that 93.1% (n=367) of the respondents prefer face to face lectures; 3.1% (n=12) prefer zoom online lectures; 2.6% (n=10) prefer slides put on the portal while 0.3% (n=1) prefer email communication and 0.3% (n=1) preferred portal interference. From the results, we can deduce that there is remarkable evidence that majority students prefer face to face lectures. As for the level of stressfulness between face to face lectures and virtual lectures. 76% (n=297) stated that they found virtual classes more stressful as compared to Face – to- Face lectures representing 24% (n=94). As on preferred mode of examination, 80.1% (n=313) stated that they preferred face to face paper-based examinations as compared to 19.9% that preferred online examinations.

5. Conclusions

Lecturers are confronted with many challenges in virtual classes such as online evaluation and creating digital content for students, lack of technological knowledge, etc. Most of the lecturers preferred a combination of both online and offline teaching for knowledge imparting and character building of students in the post-COVID-19 period. Although, 37% of lecturers said that online teaching is not better than conventional teaching for the superior quality of education, it is evident that these sentiments are borne out of the resistance from the lecturing staff to embarrass technology as can be seen from their unpreparedness. Advanced economies may have a benefit when it comes to launching emergency online and virtual teaching amid crises. Thus, the results of this study would persuade educational institutions and policymakers for enhancing the quality of online teaching with the latest techniques of teaching along with the support of government for improving basic infrastructure, internet connectivity, reducing the digital divide and developing rural areas for making e-learning more successful and widely accepted across India. Furthermore, proper technological training for lecturers on how to deliver virtual classes should be emphasized, as it has been discovered

to be a prerequisite for effective online class adoption and delivery. Online teaching in Zambia is still in its early stages of growth, having a clear understanding of the challenges encountered and the perceptions of lecturers can aid in the creation of successful and organized ways for conducting online classes

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