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COVID-19 and E-learning: Perception of Freshmen Level Physics Students at Lusaka Apex Medical University

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Abstract
Objective: The study focused on assessing Physics students' perceptions towards E-learning amidst COVID -19 pandemic.
Materials and Methods: This study used a Cross-Sectional design through an online survey and was conducted at the Lusaka Apex Medical University. A sample size of 210 students was purposively sampled and a questionnaire was used to collect data. Microsoft Excel 2013 was used to analyze the data and descriptive statistics was used to report frequencies and proportions of responses on the level of knowledge of learners towards E-learning, E-learning experiences of the students and pros and cons of E–learning.
Results: The study reported that 97.9% of the students were aware of E-learning and only 2.1% did not have an idea about it. Most of the students had a positive E-learning perception with few barriers such as gender, internet access and domestic activities. The students perceived E-learning to be convenient for lessons, ease submission of assignments and readily available online learning resources. On the other hand, students were not in favor of online laboratory and tutorial lessons. Additionally, social isolation and financial constraints during the pandemic had a negative impact on students' E-learning experience.
Conclusion: The study concluded that E-learning is possible provided that investment in internet infrastructure and training of instructors and students on its usage is done robustly. Future research is required to ascertain the actual factors that make gender a disadvantage when it comes to E-learning experiences as suggested by the minority of the students. In addition, similar studies can be conducted in other disciplines and Universities to validate the findings of this study.

Keywords: COVID-19, E-learning, Experience, Knowledge, Perception, Pros and Cons

1. Introduction

The COVID-19 pandemic has affected at least 188 countries and territories with a huge impact on the lives of six million and five hundred thousand (6.5 million) people [1]. While countries are at different points in their COVID-19 infection rates, education sector is heavily affected by the closure of learning institutions, to slow its spread. The global academic calendar has been thrown into a state of disarray by the COVID -19 outbreak. Most schools from basic to Universities have shut down their doors and students have returned to their permanent place of shelter for social isolation [2]. As a result of this, higher learning institutions have been pushed into experimenting Electronic learning (E–learning) within an unprecedented scale [1, 2]. E-learning is defined as the use of computer network technology, primarily over or through the internet, to deliver information and instructions to individuals [3, 4].

In Zambia, the government reported the first confirmed cases of COVID-19 on 18th march, 2020. Since then, the number of cases has increased and is currently at one thousand and eighty nine (1089) as of 15th May 2020 [5]. In order to reduce the cases of COVID-19, governments introduced a series of measures including closure of airports, schools and Universities [6]. For this reason, Universities across Zambia have innovatively begun to use online communication and lecture delivery in order to maintain the University calendar and session dates. The importance of this study is to understand the students' perception towards teaching strategies, tools and technologies that have been put in place to replace traditional teaching as it has a direct impact on how motivated or discouraged they are to learn [7]. suggested that the main factors that influence someone's acceptance of new technology is needs and demands. If a student perceives E-learning to be useful and helpful for their study, then they are likely willing to accept it. On the other hand, hindrances such as lack of skills and access to Information Communication Technology (ICT) can prompt negative perceptions towards E-learning [8].

The implementation of E-Learning brings serious challenges; most significant of these being that students and instructors are required to have access to smartphones and laptops in addition to reliable internet. In a country such as Zambia where internet access is not easily affordable and restricted primarily to larger cities, transitioning to E-learning is thought to be an expensive undertaking. There has been mixed feelings from the students during this pandemic and its effect on the University's learning activities but not much has been published about this. The purpose of this study was to assess Physics students' perceptions towards E-learning amidst COVID-19 pandemic at Lusaka Apex Medical University. The results can thus be used by the University to bring about the necessary changes such as incorporating advanced E-learning technologies, strategies and tools that can improve the teaching and learning of Physics. The objectives of this study were to

assess the level of knowledge students have towards E-learning and E-learning experience of the students and identify the pros and cons of E- learning during the COVID-19 pandemics.

2. Research Methodology

This study used a Cross-Sectional design through online survey with voluntary participants from the Lusaka Apex Medical University Physics students. The study population of 441 registered students in Introductory Physics was used and the sample size of 210 was calculated using the Yamane sampling technique. Purposive sampling method was used based on the availability of participants' responses because not all students participated in the survey. The research involved the administration of questionnaire as the primary source of data collection. Microsoft Excel 2010 was used to analyze the data. Descriptive statistics was used to report frequencies and proportions of responses on demographic characteristics of the participants, the level of knowledge of learners towards E-learning, E-learning experiences of the students and pros and cons of E–learning.

2.1. Ethical Consideration

Ethical values were considered in this study by obtaining a written consent letter from Lusaka Apex Medical University Research Committee. Consent was also obtained from the participants after explaining the importance of the study to them. Anonymity of the participants was maintained throughout the study.

3. Results

This section presents results on COVID-19 and E-learning: perception of freshmen level Physics students at Lusaka Apex Medical University. These results were obtained by administering a questionnaire to 210 students as the sample size but only 194 responded to the questions giving a response rate of 92.4%.

3.1 Socio-demographic

The socio-demographic data of this study was limited to gender, age**,** marital status, employment status and place of residence as shown in table 1.

Table 1: Socio-demographic characteristics of the participants (n=194)

Variables	Category	Frequency	Percentage
Gender	Male	81	41.7
	Female	113	58.3
Age	15 – 19	63	32.5
	20 – 24	117	60.3
	25 – 29	12	6.2
	30 and above	2	1.0
Marital status	Single	193	99.5
	Married	1	0.5
Employment status	Full time	13	6.7
	Part – time	8	4.1
	Unemployed	173	89.2
Place of Residence	Lusaka	73	37.6
	Outside Lusaka	120	61.9
	No response	1	0.5

3.2 Level of knowledge students have towards E-learning

The majority of the students were knowledgeable of E-Learning as shown in table 2.

Table 2: Students' level of knowledge towards E- learning (n=194)

S/N	Variables	Category	Frequencies	Percentages
1	Do you have an idea about E- learning?	Yes	190	97.9
		No	4	2.1
2	If the answer in question 1 is yes, how do you rate your knowledge based on the key below?	Low	29	15.3
		Medium	133	70.0
		High	28	14.7
3	Have you ever used E- learning platform before Covid – 19 pandemic?	Yes	4	2.1
		No	190	97.9
4	If the answer to question 3 is 'no', then how did you come to know about E- learning?	Internet	14	7.4
		Learning Institution	149	78.4
		Friends	11	5.7
		Others	6	3.2
		No response	10	5.3
5	Have you been trained by your institution on how to use E-learning for lessons?	Yes	182	93.8
		No	12	6.2
6	If your answer to question 5 is yes, how effective was the training?	Very good	21	11.6
		Good	114	62.6
		Poor	33	18.1
		Very poor	14	7.7
7	Do you have access to internet for online classes?	Yes	172	88.7
		No	20	10.3
		No response	2	1.0
8	How is E-learning conducted at your institution?	Watching pre-recorded videos of the lessons	1	0.5
		Having live lectures via the internet	13	6.7
		Listening to pre-recorded audios of the lessons	3	1.6
		Reading posted lecture materials	176	90.7
		No response	1	0.5
9	How good is your internet provider?	Very bad	21	10.8
		Bad	58	29.9
		Good	103	53.1
		Very Good	11	5.7
		No response	1	0.5

10	Which communication platform is used for online lessons?	Zoom	7	3.6
		Skype	0	0
		You-tube	0	0
		Moodle	13	6.7
		Google classroom	174	89.7
		others	0	0

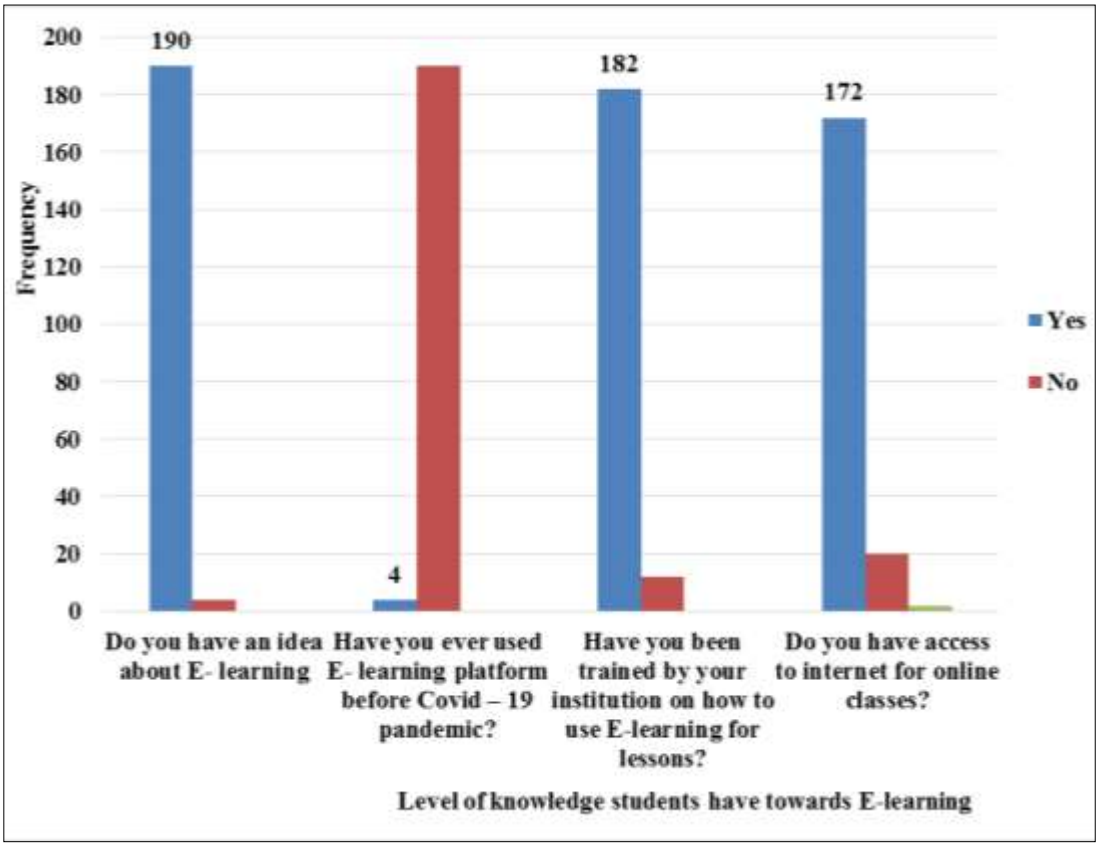

Fig 1: The Level of knowledge students have towards E-learning.

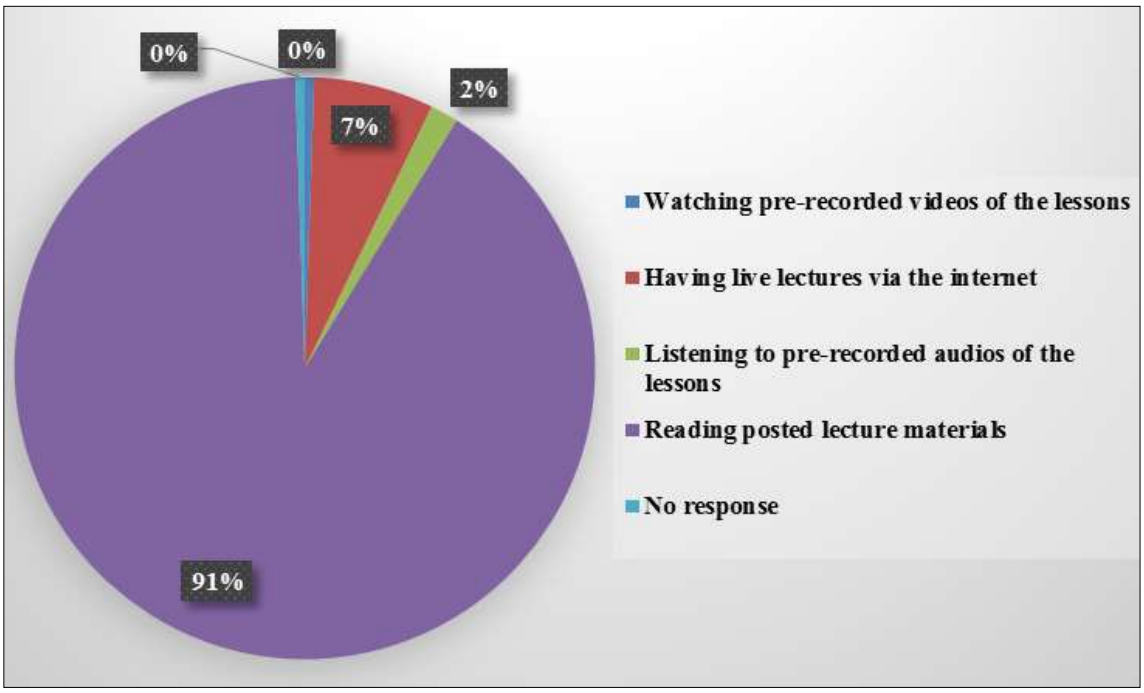

Fig 2: Ways of conducting E-learning

3.3 The E- Learning experiences of the students

The Learning experience of the students was assessed as shown in table 3.

Table 3: E- learning experience of the students (n=194)

S/N	Variables	Category	Frequencies	Percentages
1	Which device do you use for online lessons?	Smartphone	173	89.2
		Computer	11	5.7
		Tablet	8	4.1
		Other	2	1.0
2	How often do you use the internet?	At least Once/Day	194	100
		At least Once/Week	0	0
		At least Once/month	0	0
3	Do house chores activities affect your E-learning experience?	Yes	156	80.4
		No	37	19.1
		No response	1	0.5
4	If the answer in question 3 is yes, how much do these activities distract your E- learning?	Highly affected	63	40.4
		Moderately affected	76	48.7
		Less affected	17	10.9
5	Do you get assistance during E – learning whenever required?	Yes	104	53.6
		No	85	43.8
		No response	5	2.6
6	If your answer in question 5 is yes, between male and females, who do you get help from the most?	Males	56	53.8
		Females	46	44.3
		No response	2	1.9
7	Do you think that your gender is disadvantaged during E- learning?	Yes	68	35.1
		No	123	63.4
		No response	3	1.5
8	If the answer to question 7 is yes, how can you rate the level of disadvantage?	Very high	15	22.1
		High	33	48.5
		Very low	3	4.4
		Low	17	25.0
9	Does negative news and events about Covid – 19 affect your E-learning?	Yes	108	55.7
		No	85	43.8
		No response	1	0.5

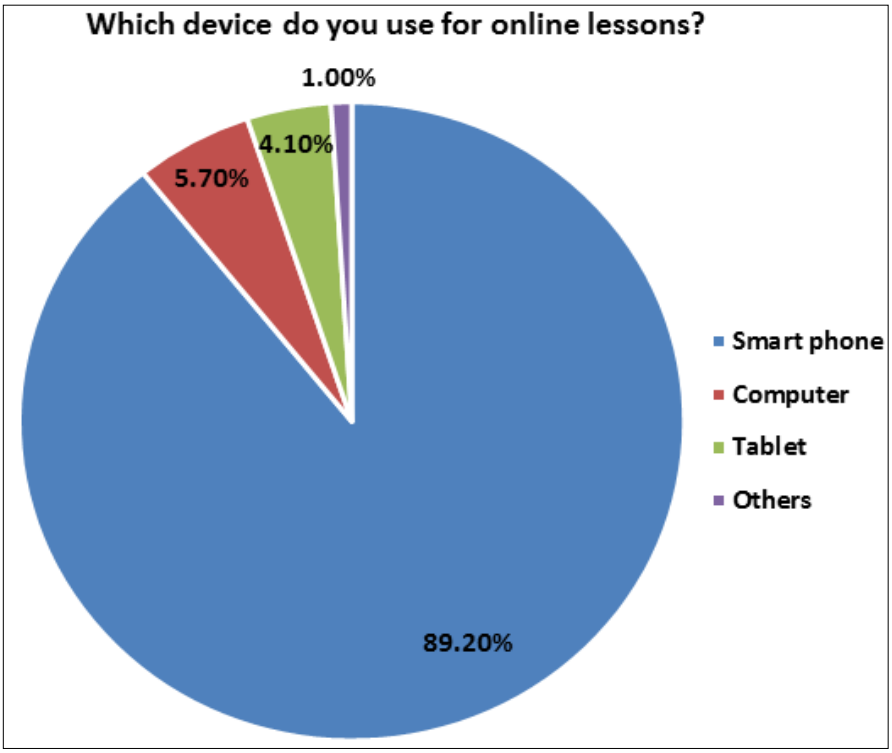

Fig 3:-Devices used for E–learning.

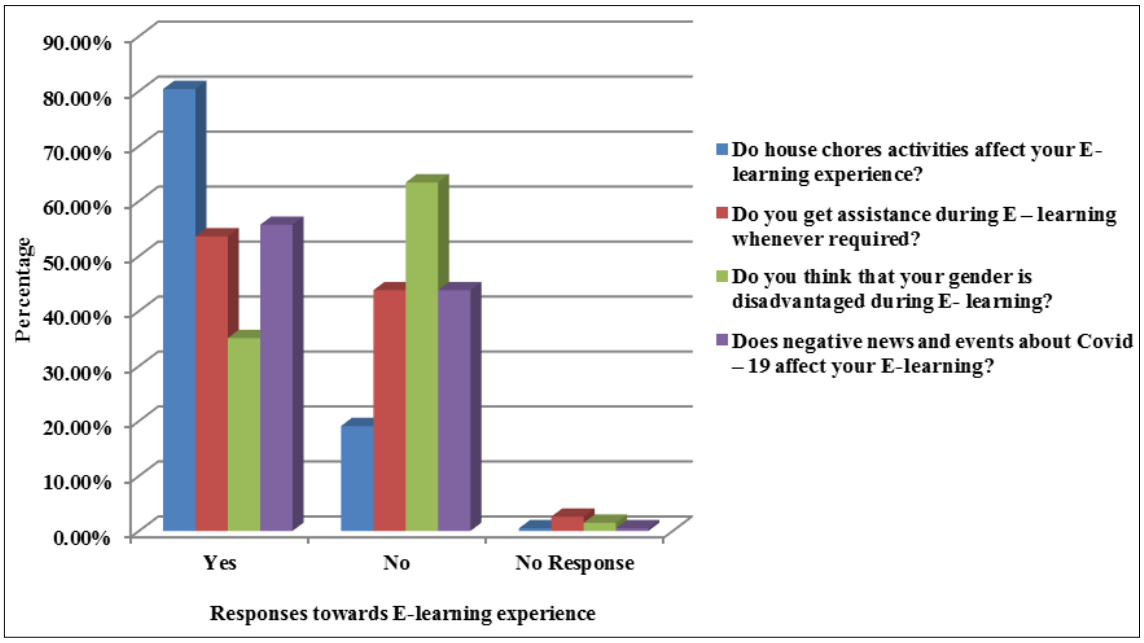

Fig 4: E- learning experiences of the student

3.4 Pros and cons of E- learning during Covid -19 pandemic

Most of the students have expressed their interest in E–learning as shown in table 4.

Table 4: Pros and cons of E- learning during COVID-19 pandemic (n=194)

S/N	Variables	Category	Frequencies	Percentages
1	I am comfortable communicating electronically during online lessons real time	Strongly agree	19	9.8
		Agree	92	47.4
		Disagree	83	42.8
		Strongly disagree	0	0
2	I can ask questions and receive a response during online class.	Strongly agree	16	8.2
		Agree	110	56.7
		Disagree	58	30.0
		Strongly disagree	8	4.1
		No response	2	1.0
3	I can meet the deadlines for my assignments	Strongly agree	31	16.0
		Agree	132	68.1
		Disagree	27	13.9
		Strongly disagree	2	1.0
		No response	2	1.0
4	It is easy to download reading materials	Strongly agree	23	11.9
		Agree	113	
		Disagree	45	23.2
		Strongly disagree	12	6.2
		No response	1	0.5
5	I feel that the content presentation and activities are engaging.	Strongly agree	26	13.4
		Agree	117	60.3
		Disagree	37	19.1
		Strongly disagree	5	2.6
		No response	9	4.6
6	Pre-recorded audio and videos are clearer	Strongly agree	35	18.0
		Agree	99	51.1
		Disagree	46	23.7
		Strongly disagree	8	4.1
		No response	6	3.1
7	Do you prefer the online Physics practical lessons over the traditional lab sessions?	Yes	34	17.5
		No	152	78.4
		No response	8	4.1
8	I can understand Physics concepts better through E-learning than traditional teaching methods.	Strongly agree	6	3.1
		Agree	13	6.7
		Disagree	98	50.5

		Strongly disagree	75	38.7
		No response	2	1.0
9	I believe that online learning is good for Physics theory but is difficult for practical work.	Strongly agree	99	51.0
		Agree	74	38.2
		Disagree	5	2.6
		Strongly disagree	15	7.7
		No response	1	0.5
10	Are you able to get sufficient assistance with Physics tutorials during online E-learning?	Yes	80	41.2
		No	107	55.2
		No response	7	3.6
11	I feel that face-to-face contact with my instructor is necessary to learn Physics.	Strongly agree	116	60.3
		Agree	57	29.3
		Disagree	18	9.2
		Strongly disagree	2	1.0
		No response	1	0.5
12	It not easy to write an online test for assessment purposes.	Strongly agree	52	26.8
		Agree	72	37.1
		Disagree	48	24.8
		Strongly disagree	19	9.8
		No response	3	1.5
13	Has E-learning limited your “Campus Experience” such as extra-curricular clubs and activities that are important for your personal enhancement and mental health?	Yes	137	70.6
		No	51	26.3
		No response	6	3.1
14	Has E-Learning reduced the amount of interaction with your instructors (consultation times/ clearing doubts etc.)?	Yes	166	85.6
		No	25	12.9
		No response	3	1.5
15	If yes, has this made course work more challenging to get through?	Yes	154	92.8
		No	12	7.2
16	Do you think E-learning will affect your communication and interpersonal skills positively or negatively?	Positively	68	35.1
		Negatively	121	73.8
		No response	5	2.6
17	Do you think E-learning will affect your teamwork skills positively or negatively?	Positively	53	27.3
		Negatively	137	70.6
		No response	4	2.1
18	Has social isolation caused you mental stress?	Yes	105	54.1
		No	81	41.8
		No response	8	4.1
19	Has COVID-19 made funding for your education more difficult?	Yes	161	83.0
		No	27	13.9
		No response	6	3.1
20	If yes, does this in turn impact your academic performance?	Yes	120	74.5
		No	41	25.5
21	Has COVID-19 and E-learning helped you adapt to new situations quicker?	Yes	115	59.3
		No	76	39.2
		No response	3	1.5

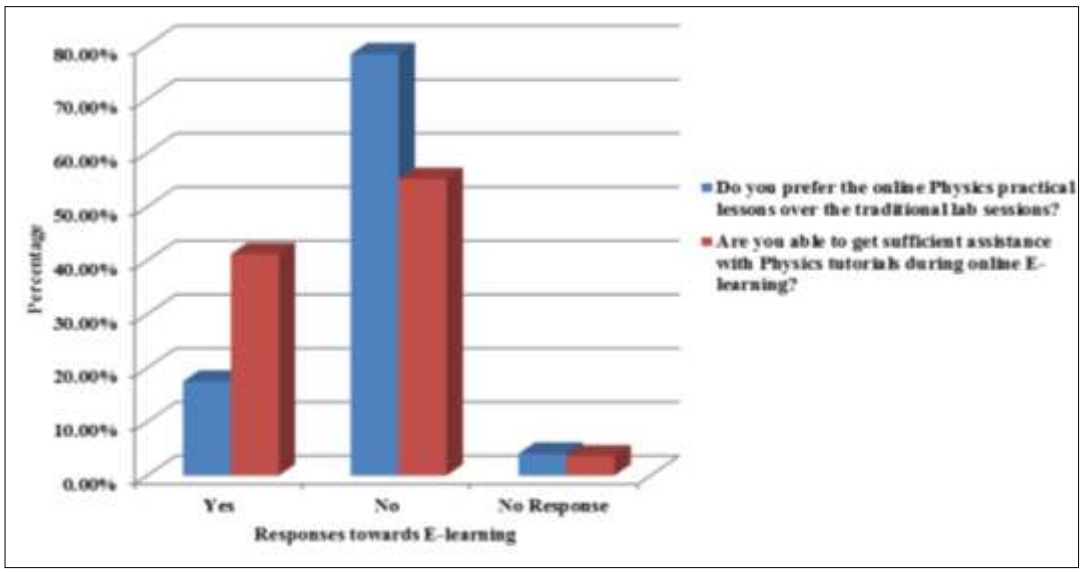

Fig 5: Perception towards E-learning.

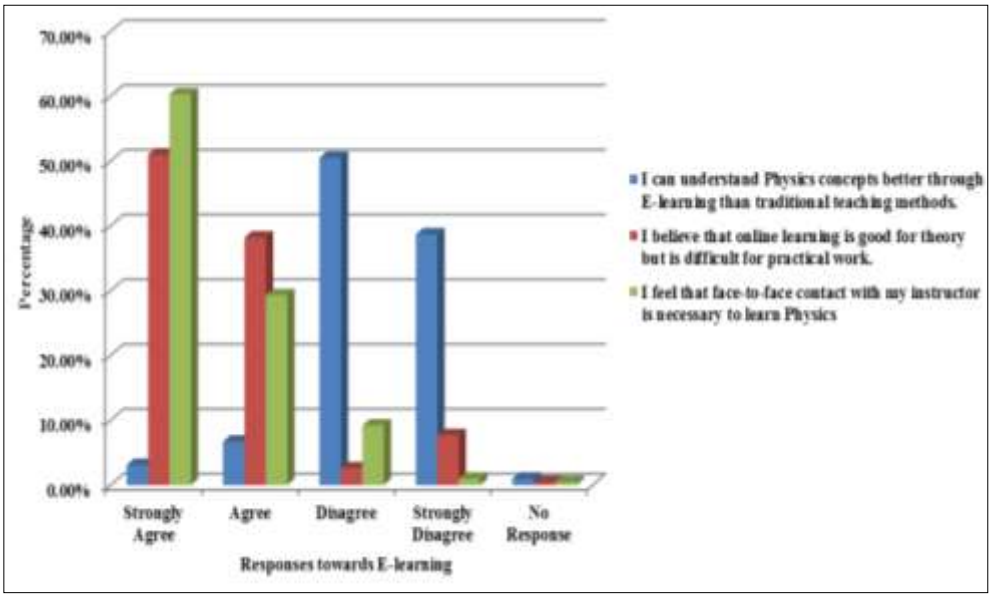

Fig 6: Level of comfort in using E- learning.

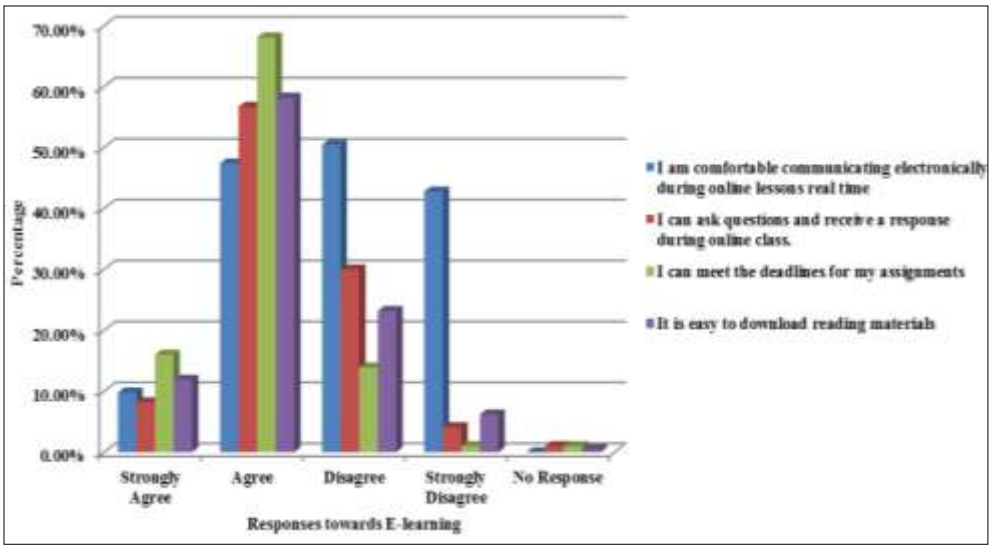

Fig 7: Level of comfort in using E-learning.

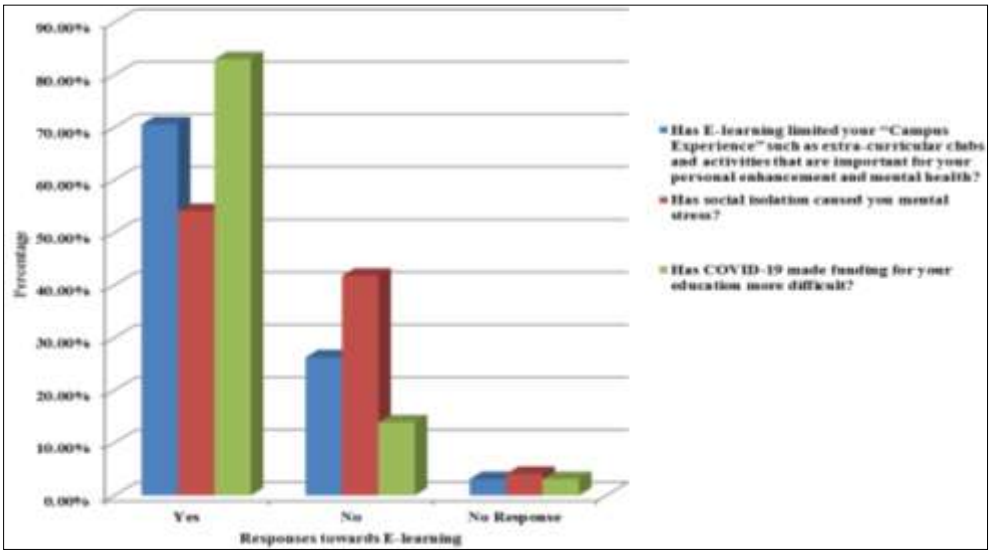

Fig 8: Psychological consequences of E-learning.

4. Discussion

The study assessed students' perceptions towards E-learning amidst COVID-19 pandemic. The main findings were that 97.9% of the participants knew what E-learning was all about and only 2.1% did not have an idea about it. Generally, most of the students had a positive E- learning perception with barriers of gender, internet access and domestic activities. The students perceived E–learning to be convenient for lessons, ease submission of assignments and readily available online learning resources. However, online laboratory and tutorial lessons adversely affected their learning experience. In addition to these, social isolation and financial constraints during the pandemic had a negative impact on their E-learning experience.

4.1 Level of knowledge students have towards E-learning

The majority of the participants (60.3%) were between the age of 20-24 years old, followed by 32.5% of the participants between the age group of 15-19 years old, 6.2% were between 25-29 years old and 1% were for 30 years old and above. In this study they were more females (58.3%) compared to the male (41.7%) students. These results are in line with the number of registered male and female students at the University. The results also revealed that the majority of the participants (97.9%) were aware of the implementation of E-learning systems and only 2.1% had no idea about it. The majority of the participants were between 20-24 years old; 60.3% of the participants were aware of E-learning because they spent most of their time browsing. These findings also show that gender was not a factor about how the students perceived E-learning because both female and male students were knowledgeable about it. Similar results were found by [9]. which indicated that there is no difference between male and female students which each of them are aware of the E-learning system in their study life. In contrast to this, [10]. concluded that female students tended to accept the use of ICT more than their male counterparts. The 2.1% of the participants who said they didn't have an idea about E-learning could be attributed to lack of understanding of the term "E-learning".

A good number of the participants (78.4%) came to know about E-learning through training by the learning institution after COVID-19 had started. This was followed by 7.4% who knew E-learning through the internet, 5.7% through friends and 3.2% by other means. Just before Covid -19 lock down was implemented in Zambia, the University trained all the students on how to use Google classroom for E-learning. This is a reason why the majority (78.4%) of the students only knew E-learning after the training because there were no online classes before the pandemic. The 7.4% of the participants who knew about E-learning through internet can be attributed to the fact that after the students heard about migrating from traditional to online classes during the COVID-19 lock down, they started researching about it. [11]. Reported that internet is widely used as a research and educational tool, providing a society with access to global information and instant communication. Additionally, access to the internet can occur anywhere including homes, work and schools.

Most students (74.2%) perceived the training that was rendered by the University on E- learning to be good with 25.8 % as poor. The 25.8% of the participants who had a negative perception about the training could be attributed to the resistance the students expressed when the University migrated from the traditional to online classes. In addition to that, some of the students did not have the electronic gadgets to carry out the training. Hindrance such as lack of skills and access to ICT can prompt negative perceptions towards E-learning [8].

The common communication platform used for online lessons was Google classroom (89.7%), followed by Moodle (6.7%) and Zoom (3.6%). The inception of COVID-19 compelled the University to quickly find a platform that was easy and not expensive to use for online classes. Google classroom was chosen as the primary option while alternative advanced E-learning technologies that can improve the teaching and learning of physics were being put in place. According to the study done by [12]. Google classroom has all the basic components that make its utility high because it comes with G-suite and cost effective. [13]. Also revealed that lecturers are able to distribute lesson materials or assignments directly to each student or the whole class. On the other side, students can submit assignments or post questions directly to class lecturer and get feedback without the necessity of meeting face-to-face.

The study also revealed that 90.7% of E-learning lessons were conducted by posting lecture materials on Google classrooms, followed by live lectures via the internet (6.7%), pre-recorded audios of the lessons (1.6%) and 0.5% by pre-recorded videos of the lessons. Posting materials on Google classrooms was the most common method of lesson delivery because it was difficult for the lecturers to find enough time to prepare audios, videos and live lectures via internet amidst COVID-19. Although posting learning materials was the most preferred method at Lusaka Apex Medical University, the study conducted by [14]. indicated that many students felt that lecturers' different styles for posting learning materials online often caused much anxiety and confusion and that affected the students' quality of learning.

4.2 E- Learning experience of the students

The most commonly used electronic devices by the students were a smartphone (89.2%), followed by computers (5.7%), tablets (4.1%) and others (1%). Further all the students used the internet at least once per day. The common use of smartphones by the students can be attributed to the fact that they are affordable in Zambia, portable and it has most of the functions that a computer has. Similar results were found by [15]. that students use smartphones as learning aids due to many reasons such as they provide convenience, portability, comprehensive learning experiences, multi sources and multitasks, and environmentally friendly.

The majority of the students (80.4%) admitted that house chores affect their learning progression and 19.1% were not affected. The higher percentage (80.4%) can be attributed to the Zambian cultural values where everyone is expected to help with house chores. Similar results were found by [16]. that parents assigned more household activities to children because of their traditions and economic problems which has adversely affected their learning. The 19.1% which was not affected by house chores could be students coming from rich families where helpers do all the domestic work.

The learning experience from most students has not provided empirical evidence that either of the gender is underprivileged during E-learning. Majority of the students (64.4%) suggested that gender was not a disadvantage towards E-learning. Only 35.1% suggested that gender

created a deprivation though the actual factors were not considered further in this study.

Many students (55.7%) attested that negative news and events about COVID-19 adversely affected their learning but 43.8% were not. In Zambia, the Ministry of Health updates the cases of COVID-19 on a daily basis which could increase the anxiety among the students. In addition to this, unreliable news from the social media had a negative impact towards E-learning. The study [17]. published that worry and anxiety tend to affect a person's mood and that this may affect the learning progress of the students especially that the learning is not face–to–face.

4.3 Pros and cons of E-learning during COVID -19 pandemic

The results of this study suggested that 57.2% students were contented with synchronous electronic communication during online lessons and 42.8% of the students were not comfortable communicating real time. These figures correlated well with the results from the previous section where 58.8% of the students had high performance internet access that helped facilitate hassle-free electronic communication.

The majority of the students (64.9%) felt that they got responses promptly from the lecturers during their online classes and 34.1% did not. Most students could have been satisfied with the responses they received because the instructors were hard working and committed in this unprecedented and difficult period. The 34.1% of those who did not get good response can be attributed to slower internet connectivity and lack of understanding of the concepts.

A vast majority (84.1%) of students thought E-learning platforms such as Moodle and Google classroom made it easier to meet assignment deadlines. However, 14.9% responded that it was hard to submit assignments online. Students preferred the online way of submission because it can be done instantly in the comfort of their homes. The constant reminder of due dates on the home page also might have helped the students to submit the assignments on time. The students value the submission flexibility and economy offered by an electronic system as well as the opportunity, afforded by long deadlines, to discuss assessment strategies and solutions with their peers [18]. The 14.9% of the participants who did not favor the online submission of assignments could be attributed to lack of interaction with their peers, lack of proper software's and good internet connectivity.

A good number of students (69.1%) were satisfied with the quality of pre-recorded videos and 27.8 % felt that the audio and video quality was poor. This could be attributed to the devices possessed by students and the quality of the support system installed on their devices.

Most of the participants (78.4%) did not prefer the online Physics laboratory lessons over the traditional sessions. However, 17.5% preferred online laboratory sessions. This outcome of the survey was strengthened by 89.2% of the participants who felt that they can understand the Physics concept better through traditional teaching methods than E-learning. The study by [19]. indicated that students perceived traditional labs as being more "easy to operate", "easy to understand", "flexible to use in relation to time and place" and "satisfying" than virtual labs overall.

The bulk of the students (89.3%) strongly believed that face-to-face interaction with the instructor is necessary to understand the subject of Physics while 10% did not. 55.2% of students were not happy with the online tutorial sessions as they did not get adequate support from tutors in clearing their doubts. On the other hand, 41.2 % of students who were satisfied could be attributed to their supplementary learning from other resources.

A good number of the students (63.9%) had a negative perception while 34.6% had a positive perception towards online tests/assessments. Students living outside of Lusaka (61.9%) may have experienced poor access to internet and interruptions in power supply. This in effect could have made it difficult to submit their online assessments on time and hence created a negative perception towards online tests/assessments.

Majority of the students (70.6%) had a feeling that E-learning limited the enjoyment of their extracurricular activities on campus while 26.3% were not. Similar results were found by [20]. which indicated that participation in extracurricular activities is associated with higher levels of psychosocial functioning and healthy behavior. Out of the 210 students, 73.8% believed that E–learning during COVID-19, negatively affected their interpersonal communication skills as they had limited opportunities for personal interaction with their peers. On the other hand, 35.1% of the participants felt that they can communicate effectively with other means even without on-campus interactions.

Increased mental stress due to social isolation was found to be 54.1 % of the students surveyed. The isolation from teachers and classmates makes it difficult for the students to avail personal help and assistance when needed. This can contribute to an increased mental stress which in turn affects their academic work. Similar study showed that the lack of a physical classroom and instructor can be frustrating and de-motivating and this may leave them with a feeling of isolation and lack of support [21]. On the other hand, students (41.8%) experienced no mental stress resulting from social isolation. This could have been due to their better personal facilities and strong family support. In addition to this, 83.0% of students felt that COVID-19 crisis had a financial impact on their education. This is because of the high cost of accessing internet in Zambia in addition to the regular tuition fees.

5. Conclusion

The emergence of COVID-19 pushed Universities to opt into E-learning. This study reported that the majority of students were knowledgeable and had a positive perception towards E-learning. Hence, the study concluded that online education is a way to go especially that the whole world is transitioning to the 4th industrial revolution. The University should invest in advanced technologies that will make Physics lessons interesting to the students additionally; the instructors and students should be well trained in using advanced E-learning technologies for Physics lessons.

There are minor challenges in implementing E-learning lessons such as access and availability of internet therefore there is a need for the University to invest in good internet infrastructure. Future research is required to ascertain the actual factors that make gender a disadvantage when it comes to E-learning experiences as suggested by the minority of the students. In addition, similar studies can be conducted in other disciplines and Universities to validate

the findings of this study.

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