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Post Covid-19 Pandemic: Evaluating The Effectiveness Of Digital Learning Platforms For Students' Engagement In Mathematics Lessons

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Abstract, *School closures in Nigeria during the Covid-19 pandemic left millions of students and lecturers dependent on online teaching and learning. Online teaching and learning are an unprecedented experience for most lecturers and students; consequently, there was then a limited experience with it. This study examined and evaluated the integration of Digital Learning Platforms into the teaching and learning of mathematics during the COVID-19 pandemic. Furthermore, it assesses the perception of both students and lecturers about the use of Digital Learning Platforms and their general rating of the effectiveness of the available digital platforms for mathematics teaching and learning processes. Simple random sampling procedure was used to select twenty (20) lecturers and hundred (100) undergraduate students from a federal government owned university in the Southwestern State of Nigeria. The percentage was used to analyze the respondents' demographic information while the Chi-Square was adopted to analyze the data. Results of the analysis of the formulated hypothesis indicated that two or more digital platforms were used by the lecturers to teach mathematics in post covid-19 pandemic and both Zoom and Google Meet are considered effective for mathematics teaching in post covid-19 pandemic. Also, lecturer's digital skills are dependent of the integration of digital learning platforms in mathematics teaching and student's academic engagement exposure is independent of digital learning in pre-and-post-covid era Based on the findings of the study, it was suggested that digital technologies may be included in mathematics curricula at various stages of education and education stakeholders should take advantage of the findings of this study to encourage lecturers to continue using technologies in mathematics teaching*

Keywords : *Digital, Evaluation, Learning, Mathematics, Platforms*

I. INTRODUCTION

The global interest for the advancement of education in developed and developing countries of the world have been challenged by digital process of teaching and learning. The pervasiveness of digital learning has brought about rapid technological, social, political, and economic transformation that has resulted in a network of society organized around Information and Communication Technology. Thelma (2020) submitted that education sector

should prepare students for the demands of work and social life by equipping them with relevant skills to understand and address the core challenges of the modern era. As it was pre COVID-19 outbreak, the basic education curriculum in Nigeria is not designed to provide students with critical skills and knowledge, especially with technological advancement. The traditional foundation of Nigeria's education system consists largely of reading, writing, arithmetic and recitation. The outbreak of COVID-19 pandemic challenged the hitherto status-quo and presents a shift in the face-to-face classroom system to digital mode of teaching and learning. The pandemic presents a case of overhauling the basic education curriculum with the aim of adequately preparing the current and next generation of students.

The unexpected digital readiness as reflected in Nigeria's education sector, where learning was disrupted for almost 40 million learners nationwide became a concern to the stakeholders. The digital infrastructure in Nigeria also paints a bleak picture for the prospect of distance learning. With only about 40 percent of Nigerians having access to the internet, and 50 percent of the population having limited/no access to the electricity grid, the current prospects of digital technology for education in the crisis period are slim. Beyond the infrastructure shortcomings, however another problem threatens distance learning even more. The digital divide is more than just infrastructure divide; it is also a literacy divide (Thelma, 2020). According to Ibrahim (2021), the digital infrastructural backwardness and the unpreparedness of some educational sectors to totally embrace such change have almost made continuing education through digital modalities unrealistic. With this, the exposition and recognition of the increasing importance of online learning is not only in this dynamic world but also in emergency.

This digital unpreparedness has revealed the weaknesses of the Nigerian educational sector and the need to rethink and review existing education infrastructure as learning has become an activity that that can be carried out irrespective of time and places amidst the pandemic, with the support of digital tools. Now is an opportunity to improve standards, contribute to knowledge-based economies, enrich learning potentials, facilitate personalized learning and in all, transform pedagogy to make it more student-centered in line with the global standard. Thus, the adoption and sustainability of digital learning is very crucial to ensuring the continuity of education in Nigeria which demands working on our digital infrastructure, up-

skilling staff and expanding their capabilities to further engage students in the teaching and learning processes effectively.

According to Ali (2020), educational institutions worldwide are moving more and more towards digital learning. China for instance, initiated a Suspending Classes without Stopping Learning policy to ensure that learning was not compromised at any time during COVID-19 pandemic lockdown. Italy as well joined the league as the first EU member state to close its universities and move courses online. According Nwachukwu, Ugwu and Wogu (2021), the researchers reported that Nigerian educational sector is currently being faced with problems transitioning to a digital educational environment due to some factors revolving around digital infrastructural and accessibility issues hence, posing a great threat to effective academic engagement of learners.

Also, Nigeria has been rooted in the bottom quarter of global broadband speed rankings for 2019 by UK analytics firm cable which presents a problematic condition that could undermine digital learning (Kazeem, 2020). It was submitted that COVID-19 pandemic presents unique challenges for Nigeria's already fragile education system. Educational innovations have occurred to make the universal adoption of digital learning a possibility. One key challenge is access. Here, extensive problems remain, including the lack of internet connectivity in some locations, especially rural ones, and the competing needs among family members for the use of home technology. However, creative solutions have emerged to provide students and families with the facilities and resources needed to engage in successfully. The year 2020 has also seen increased availability and adoption of electronic resources and activities that can now be integrated into online learning experiences. Synchronous online conferencing systems, such as Zoom and Google Meet, have allowed students from anywhere in the world to join online classrooms and have allowed presentations to be recorded for individual learners to watch at a time most convenient for them. Furthermore, the importance of hands-on, digital learning has led to innovations such as virtual field trips and virtual labs. A capacity to serve learners of all ages has thus now been effectively established, and the next generation of online education can move from an enterprise that largely serves adult learners and higher education to one that increasingly serves younger learners, in primary and secondary education and from ages 5 to 18.

While the blurring of the lines between traditional and distance education

has been noted for several decades, the pandemic has quickly advanced the erasure of these boundaries. Less single mode, more multi-mode (and thus more educator choices) is becoming the norm due to enhanced infrastructure and developed skill sets that allow people to move across different delivery systems. The well-established best practices of hybrid or blended teaching and learning have served as a guide for new combinations of instructional delivery that have developed in response to the shift to virtual learning. The use of multiple delivery modes is likely to remain, and will be a feature employed with learners of all ages 14-15. Future iterations of online education will no longer be bound to the traditions of single teaching modes, as educators can support pedagogical approaches from a menu of instructional delivery options, a mix that has been supported by previous generations of online educators.

First, the good news for institutions moving their face-to-face courses to online-only formats: large majorities of institutions have experience in the domain of online learning, providing hybrid/blended courses and completely online courses. Additionally, Christopher, Susan, and Leah Lang (2020), submitted that majorities of institutions also make provisions for testing centers and ADA compliance for distance learning. Now, for the not-so-good news: despite their experience offering online courses, institutions are in response to the COVID-19 pandemic moving courses online at an unprecedented scale, which will likely strain campus resources (e.g., IT, teaching and learning centers, and instructional designers) as instructors move their courses online. Most higher education institutions appear to have adopted and at least partially deployed the basic tools that are required for a comprehensive and sustained move to online courses. Specifically, most faculty who are being asked to move their courses online in response to the COVID-19 pandemic already have access to institutionally provided online learning systems (or LMSs), collaboration tools, and web or videoconferencing.

However, the technologies that support creative or hands-on experiences traditionally carried out in wet or computer laboratories, studios, conservatories, and other nontraditional learning spaces have seen more limited deployment, which could impede instructors in delivering online versions of their face-to-face courses. For the short term, faculty who has typically relied on digital tools in situ might need to figure out workarounds, suspend expectations that regular and normal classroom experiences are within reach, and

recalibrate their typical pedagogical approach to accommodate the realities of the moment. Additionally, the emergency move to completely online courses might afford institutions the opportunity to assess which technology services need to be expanded in the wake of the pandemic and to reconsider their investments in ones that are not really necessary to instruction.

Digital readiness for university students implies their technology-related knowledge, skills, attitudes, and competencies for using digital technologies to meet educational aims and expectations in higher education (Lauren, 2020). Student's academic engagement in higher education institutions tends to be enhanced by the adoption of digital technology by students, who are naturally proficient with technology because of their exposure to technology-rich environments (Jones, 2012). Margaryan, Littlejohn and Vojt (2011) claimed that university students in Korea who are digital natives may or may not effectively apply digital technologies for academic activities or associate them with academic literacy. Current students in the university context demonstrate a wide gap between digital skills in informal contexts and in formal learning. The prospect of ICT is a promising practice in the mathematics classroom, but the success of this exercise is mainly dependent on several issues, including lecturers' perceptions of ICT skills, lecturers' attitudes toward ICT contribution to mathematics teaching, and lecturers' attitudes toward ICT contribution to students' mathematics learning. Teacher Passion of ICT in the classroom mathematics, mathematics teacher in the presence of ICT in the classroom self-esteem and sense of control, and lecturers aim to mobilize ICT in their education, (Baya'a & Daher, 2013). These possibilities of ICT integrate a proposed practice into the mathematics classroom. ICT in the classroom, especially in the incorporation of a positive outcome will depend on the following factors: lecturers' attitudes to the contribution of ICT for teaching mathematics, mathematics education of students and lecturers' attitudes towards the role of ICT, arithmetic lecturers to use ICT in the classroom sense, that presence of ICT in the classroom mathematics lecturers' self-esteem and classroom administration ability to integrate ICT in education for lecturers and attractions.

Purpose of the Study

This study investigated the evaluation of digital learning platforms for effective students' engagement in post Covid-19 pandemic. Specifically, the study, by extension, investigated perception of learners and lecturers on the

effectiveness of available digital learning platform especially post Covid-19 pandemic. The study further addressed the correlational effect between lecturer's digital skill and integration of digital learning platforms.

Research Questions

(1) Will there be any difference between lecturers' digital skills and integration of digital learning, Covid-19 pandemic?

(2) What is lecturers' rating of effectiveness of available digital learning platforms?

(3) What is learners' rating of effectiveness of available digital learning platforms?

Research Hypotheses

HO_1: Lecturer's digital skills have no significant difference with the integration of digital learning platform in mathematics teaching.

HO_2: Lecturer's perception of effective digital learning platforms is not significantly different based on gender.

HO_3: Student's perception of effective digital learning platforms is not significantly different based on gender.

HO_4: There is no significant difference in the engagement of students exposed to digital learning platforms-pre and post COVID-19.

II. RESEARCH METHODS

The study adopted a descriptive survey using the instrumentality of researchers-designed questionnaire to elicit relevant information. Simple random sampling procedure was used to select twenty (20) lecturers and hundred (100) undergraduate students from a federal government owned university in the Southwestern State of Nigeria. Respondents were chosen across gender, age brackets, departments, levels (for students) and years of service (for lecturers). The instrument that was used in collecting data for this study was a researcher-designed questionnaire. The face and content validity of the questionnaire was established by experts in the field of education. The reliability of the questionnaire was affirmed via pilot study, scores were correlated and 0.75 reliability co-efficient obtained. The questionnaire has two (2) sections. Section A: deals with demographic information of the respondents. It consists of four variables of respondents' which are gender, age, name of institution and educational attainment. Sections B consists of items that elicit information on the main research purpose. Percentage was used to analyze the respondents' demographic information while the Chi-Square was adopted to analyze the data.

All hypotheses were tested at 0.05 alpha level of significance.

III. RESEARCH RESULTS AND DISCUSSION

Data Analysis and Presentation

Respondents Demographic Representation

Results of demographic data collected are presented in tables 1, 2, 3, 4 and 5 with relevant discussions:

Table 1
Respondents demographic representation based on Gender (Male and Female)

		Gender	
Frequency		Percentage	
		13	65.0
	Male		
Valid	Female	07	35.0
	Total	20	100.0

From table 1, it could be deduced that 13 (65%) of the respondents were male while 7 (35%) were female. This implies that female lecturers participated and engaged more in digital learning than the male lecturers.

Table 2
Respondents' demographic representation based on Qualifications

		Academic Qualification	
Frequency		Percentage	
		12	60.0
	Ph.D		
Valid	M.Sc	3	15.0
	M.Ed	5	25.0
	Total	20	100.0

From table 2, it could be deduced that 12 60%) of the respondents were Ph.D holder, 3(15%) were M.Sc holder and 5(25%) were M.Ed holder. This implies that Ph.D holders participated more in the study.

Table 3
Students' demographic data based on gender

		Gender	
Frequency		Percent	
	Male	52	52.0
Valid	Female	48	48.0
	Total	100	100.0

Table 3 showed that 52 (52.0%) of the respondents were male while 48 (48.0%) were female. This implies that there are more male students in the study.

Table 4
Students' demographic data based on the basis of faculty

		Faculty of Respondent	
Frequency		Percent	
	Science	66	66.0
Valid	Education	34	34.0
	Total	100	100.0

Table 4 deduced that 66(66.0%) of the respondents were from the Faculty of Sciences while 34(34.0%) were from the Faculty of Education. This shows that

respondents from the favculty of science participated more in the study.

Table 5

Students' demographic based on Students' Academic level

Students' Academic level			
Frequency		Percent	
Valid	100L	4	4.0
	200L	17	17.0
	300L	42	42.0
	400L	37	37.0
	Total	100	100.0

From table 5, it could be seen that 4(4.0%) of the respondents were 100L student, 17(17.0%) were from 200L, 42(42.0%) were from 300L, while 37(37.0%) were from 400L. This revealed that there are more 400level students in the study.

Research Questions

Research Question 1: Will there be any difference between lecturers' digital skills and integration of digital learning, Covid-19 pandemic?

Table 6

Lecturers' awareness and utilization of Digital Learning Platforms

S/N	Lecturers' awareness and utilization of Digital Learning Platforms	Strongly agree f(%)		Agree f(%)	Disagree f(%)	Strongly Dis f(%)
1.	Effectiveness of online teaching of mathematics versus face-to-face classroom teaching	1(5)	1(5)	15(75)	3(15)	20(100)
2.	Proficiency in digital skills may not allow most lecturers to enjoy digital platforms	3(15)	16(80)	1(5)	0(0)	20(100)
3.	Active engagement of students during online teaching of mathematics	1(5)	6(30)	12(60)	1(5)	20(100)
4.	Knowledge of ICT itself could be an advantage for the use of digital platforms by mathematics lecturers.	3(15)	13(65)	4(20)	0(0)	20(100)
5.	Digital skills acquisition for all mathematics lecturers should be encouraged to make the platforms effective.	6(30)	11(55)	1(5)	2(10)	20(100)

6.	There is a positive reinforcement in students' academic performance when exposed to digital learning.	0(0)	7(35)	12(60)	1(5)	20(100)

Table 6 shows the lecturers awareness and utilization of digital learning platforms. 1(5%) strongly agree that online teaching is more effective than face-to-face classroom teaching, 1(5%) agree, 15(75%) disagree while 3(15%) strongly disagree. Also, 3(15%) strongly agree that proficiency in digital skills may not allow most lecturers to enjoy digital platforms, 16(80%) agree while 1(5%) disagree. In addition, 13(65%) agree while 4(20%) disagree. 6(30%) strongly agree that digital skills acquisition for all mathematics lecturers should be encouraged to make the platforms effective, 11(55%) agree, 1(5%) disagree while 2(10%) strongly disagree

Research Question 2: What is lecturers' rating of effectiveness of available digital learning platforms?

Table **7**
Rating of Digital Learning Platforms based on frequency of use.

Which of these Digital learning platforms have you used or adopted in teaching Mathematics in the post covid-19 pandemic?			
	Digital platform	Frequency	Percentage
Valid	Zoom	6	30.0
	Google Meet	4	20.0
	2 and more	10	50.0
	Total	20	100.0

Based on table 7, it could be seen that 6 (30.0%) of the lecturers adopted Zoom for teaching mathematics, 4 (20.0%) adopted Google Meet, while 10 (50.0%) adopted two and more digital platform for teaching mathematics. This implies that two or more digital platforms were used by the participants to teach mathematics in post covid-19 pandemic.

Table 8
Rating of Digital Learning Platforms based on effectiveness and lecturers experience, post covid-19 pandemic.

Which of these Digital Learning Platforms will you consider effective for mathematics teaching based on your experience, post covid-19 pandemic.

	Digital platform	Frequency	Percentage
Valid	Zoom	10	50.0
	Google Meet	10	50.0
	Total	20	100.0

From table 8, it was revealed that 10(50.0%) of the lecturers consider Zoom while 10(50.0%) of the lecturers considered Google Meet to be the effective digital platform for teaching Mathematics. This implies that both Zoom and Google Meet are considered effective for mathematics teaching in post covid-19 pandemic**.**

Research Question 3: What is learners' rating of effectiveness of available digital learning platforms?

Table 9

Digital Learning Platforms engaged in learning Mathematics in the post Covid-19 pandemic.

On which of these Digital Learning Platforms were you taught Mathematics in the post Covid-19 pandemic?			
	Digital Learning Platforms	Frequency	Percent
Valid	Zoom	50	50.0
	Telegram	4	4.0
	Google Meet	24	24.0
	Whatsapp	2	2.0
	2 and More	20	20.0
	Total	100	100.0

Table 9 shows that 50 (50.0%) of the student were taught Mathematics using Zoom, 4(4.0%) were taught using telegram, 24(24.0%) were taught using Google Meet, 2(2.0%) were taught using whatsapp while 20(20.0%) were taught using 2 and more digital learning platforms. This shows that students were taught more using Zoom digital platform.

Table 10

Students' rating of Digital Learning Platforms based on effectiveness and lecturers experience, post covid-19 pandemic

Which of these Digital Learning Platforms do you consider effective for mathematics learning based on your experience, post covid-19 pandemic.			
	Digital Learning Platforms	Frequency	Percent
Valid	Zoom	55	55.0
	Telegram	8	8.0
	Google Meet	34	34.0
	Whatsapp	3	3.0
	Total	100	100.0

Table 10 deduced that 55 (55.0%) of the student considered Zoom to be effective for learning mathematics, 8 (8.0%) considered telegram, 34 (34.0%) considered Google Meet, while 3 (3.0%)

considered whatsapp to be the effective way of learning Mathematics.

Hypothesis Testing

Hypothesis One

H_0: Lecturer's digital skills are independent of the integration of digital learning platform in mathematics teaching.

$H_{1:}$ Lecturer's digital skills are dependent of the integration of digital learning platform in mathematics teaching.

Decision Rule: Reject H_o if value obtained under Chi-square Asymp. Sig. (2-sided) or P-value is < 0.05 otherwise accept H_0 at 95% confidence interval.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	11.477[a]	4	.022
Likelihood Ratio	9.146	4	.058
Linear-by-Linear Association	6.914	1	.009
N of Valid Cases	20		

a. 8 cells (88.9%) have expected count less than 5. The minimum expected count is .15.

Decision: Since the probabilities of the Pearson Chi-square are (0.022) and Likelihood Ratio (0.058) respectively is less than the alpha level of significance (0.05), therefore the (Null Hypothesis) H_0 is rejected.

Conclusion: it can be concluded that lecturers' digital skills are dependent of the integration of digital learning platform in mathematics teaching.

Hypothesis Two

H_0: Lecturer's perception of effective digital learning is independent on gender.

$H_{1:}$ Lecturer's perception of effective digital learning is dependent on gender.

Decision Rule: Reject H_o if value obtained under Chi-square Asymp. Sig. (2-sided) or P-value is < 0.05 otherwise accept H_0 at 95% confidence interval.

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.978[a]	1	.160		
Continuity Correction[b]	.879	1	.348		
Likelihood Ratio	2.027	1	.155		
Fisher's Exact Test				.350	.175
Linear-by-Linear Association	1.879	1	.170		
N of Valid Cases	20				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.50.

b. Computed only for a 2x2 table

Decision: Since the probabilities of the Pearson Chi-square are (0.160) and Likelihood Ratio (0.348) respectively are greater than the alpha level of significance (0.05), therefore the (Null Hypothesis) H_0 is not rejected.

Conclusion: it can be concluded that lecturer's effective digital learning perspective is independent on gender.

Hypothesis Three

H_0: Student's perception of effective digital learning is independent on gender.

H_1: Student's perception of effective digital learning is dependent on gender.

Decision Rule: Reject H_0 if value obtained under Chi-square Asymp. Sig. (2-sided) or P-value is < 0.05 otherwise accept H_0 at 95% confidence interval.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.747[a]	3	.862
Likelihood Ratio	.753	3	.861
Linear-by-Linear Association	.194	1	.659
N of Valid Cases	100		

a. 4 cells (50.0%) have expected count less than 5. The minimum expected count is 1.44.

Decision: Since the probabilities of the Pearson Chi-square are (0.862) and

Likelihood Ratio (0.861) respectively are greater than the alpha level of significance (0.05), therefore the (Null Hypothesis) H_0 is not rejected

Conclusion: it can be concluded that student's effective digital learning perspective is independent on gender.

Hypothesis Four

H_0: Student's academic engagement exposure is independent of digital learning in pre-covid and post-covid era

H_1: Student's academic engagement exposure is dependent of digital learning in pre-covid and post-covid era

Decision Rule: Reject H_o if value obtained under Chi-square Asymp. Sig. (2-sided) or P-value is < 0.05 otherwise accept H_0 at 95% confidence interval.

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	18.578[a]	12	.099
Likelihood Ratio	19.992	12	.067
Linear-by-Linear Association	.636	1	.425
N of Valid Cases	100		

a. 13 cells (65.0%) have expected count less than 5. The minimum expected count is .08.

Decision: Since the probabilities of the Pearson Chi-square are (0.099) and Likelihood Ratio (0.067) respectively are greater than the alpha level of significance (0.05), therefore the H_0 (Null Hypothesis) is not rejected.

Conclusion: it can be concluded that students' academic engagement exposure is independent of digital learning in pre-and-post-covid era.

Summary of Findings

It was deduced from the demographic information of respondents that most of the lecturers and students that participated in this study are largely familiar with the use of Zoom for delivery and reception of mathematics lessons, respectively. Google meet App followed Zoom closely in the statistics of platforms used by both lecturers and students. Zoom is also the only platforms respondents found most effective for mathematics teaching and learning processes. The result of this study indicates that face-to-face learning was perceived more positively than online learning in term of social presence, interaction, satisfaction and overall quality. Even though online classes were reported to be convenient in term of saving time, still both lecturers as well as the students perceived it to be less effective and structured when compared to classroom mode of learning. Lecturers'

effective skills of handling digital learning platforms were found to be a major cause of this. The study yielded an interesting point showing that some lecturers cannot integrate ICT into their courses effectively because they don't have the proficiency skill to handle such platform.

Discussion

The study generally revealed that quality education as a key to National development cannot be relegated to the background but must be fully funded and adequately equipped to face the challenges of sustainable development goal. The Covid-19 pandemic in line with its social distancing status created the need for digital learning which has before now been in neglect and abandoned owing to the deplorable state of our infrastructure and educational sectors.

It was found out there are significant differences in lecturers ICT skills and integration of digital learning into their teaching. This result is in agreement with that of Idowu, Adagunodo and Popoola (2003) who had earlier submitted that most of the lecturers at tertiary imn Nigerian universities, colleges of education, and polytechnics do not have competence in the use or integration of e-learning in their instruction. Majority of lecturers who had taken teaching jobs were taught without ICTs (e-learning and they have not developed competence in the use of ICTs (e-learning), thus they cannot model good use of technology.

Significant gender differences regarding effective digital learning were evident after careful analysis of the obtained results from the respondents. And this provide answers to hypotheses two and hypotheses three that were stated as "Lecturers' perception of effective digital learning is not significantly different based on gender and students' perception of effective digital learning is not significantly different based on gender" respectively as both hypotheses stand accepted. This further affirm the stand of Sanchez-Franco MJ (2006) where it was submitted that in terms of digital technology, women and men differ in their levels of trust, risk aversion and information processing, but also in their attitudes and instrumental motives of using and accepting digital environments. A previous research had also found out that in the case of lecturers, some studies have not found significant differences between the teacher’s performance in online teaching and in face-to-face teaching. If these differences do exist, they are likely due to the instructor’s involvement with and the institution’s commitment to the deployment of the method of instruction.

Students in the current study showed positive feelings about the use of technology in mathematics. From the results, we can infer that they had increased motivation, and were technologically confident. However, their perception towards digital learning in mathematics teaching has no difference significantly. It was found that boys and girls showed no significant difference in their overall perception and attitude towards the use of technology in Mathematics teaching. Both revealed positive attitude. However, there are few students less convinced.

Hypothesis four of this study was set to assess the significant difference between students' academic engagement during pre-and- post- Covid-19 era when they have been exposed to learning via new technologies. It was found that there is no significant difference in students' academic engagement during the stated periods. This result is however different from the stand of Arkorful & Abaidoo (2015) that University students benefit from the adoption of e-learning in numerous ways, including through the flexibility of learning in terms of both time and place, the efficacy of accessing knowledge and information, educational interactivity, differentiation according to individual students, and self-pacing and thereby giving them an edge to perform excellently well than they will do in a face-to-face learning arrangement.

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IV. CONCLUSION

The closure of schools has revealed a number of problems. On the one hand, a pedagogical problem derived from the majority use of transmissive teaching, centered on the teacher, which does not fit with the innovative (disruptive) models of online education. Some of these problems as identified by the researchers were summarized, below:

From the students point of view, identified drawbacks in the process of integrating digital learning platforms into Mathematics classes during the Post COVID-19 era are:

(i) Poor ICT know-how of their lecturers; (ii) Poor internet service during the teaching-learning activities; (iii) Inability to ask questions most times; (iv) Lecturers lay more emphasis on their already prepared note without explaining the topic content; and, (v) Parental influence among other factors.

From the Lecturers Point of View, identified drawbacks are:

(i) Technical Skills: Some lecturers don't have sufficient skills to develop digital Mathematics contents not to talk of them integrating it; (ii) Making

lessons more difficult: Making electronic content on mathematics education is a time and money consuming process; (iii) ICT restricts the scope of explanation: Some subject contents may require more proof and discussions like problem-solving, drawing mathematical figures, geometrical shapes, drawing curves and graphs, (iv) Poor ICT accessibility: Poor ICT infrastructure in university and poor coordination with ICT centers for day to day arrangements is another barrier. (v) The applicability of all subject's content: ICT is not easy to apply to the Mathematics, application of Mathematics

Results of analysis showed different types of digital technologies used in mathematics education included (Zoom, Google Meet, Telegram, and others) in mathematics, and their effects in enhancing students' academic engagement during the post COVID-19 era

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