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Optimizing Digital Instructional Delivery in Technical Education in the Post COVID-19 Era

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Abstract
The onset of COVID-19 has heightened the awareness of educators across disciplines regarding emerging pedagogies that can ensure continuous learning for students from diverse cultural backgrounds during and after the pandemic. This study focused on the importance of optimizing digital instructional delivery in technical education in the post-COVID-19 era. The research was guided by two key questions: whether digitized instruction should be prioritized in technical education, and the rationale behind its importance. A qualitative approach was employed for data collection and analysis, with 21 participants who were experts in technical education, holding doctoral degrees and extensive relevant experience. Data was gathered through interviews, conducted both face-to-face and via social media, and analyzed using content analysis. The study's findings underscored the necessity of optimizing digital instructional methods in technical education for the new normal. Based on these findings, the study recommends that educators in technical education embrace digital teaching methods to meet the evolving pedagogical needs of students in the post-COVID-19 era.
Keywords*:* Technical Education, Converged Learning, Digital, Instructional Delivery, COVID 19.

Introduction

Instructional delivery in the post-COVID 19 era has taken a new turn across the globe, as strict attention has been drawn to digitalization. Leveraging on the affordances of Information and Communication Technology(ICT) to pass instructions to students of varying backgrounds and locations have come to stay and gained dominance across different fields of learning. Also, innovation in technology has made provisions of multiple choices for scholars to adopt and make teaching and learning impactful in any field of their choice (Shelke, 2018).

This singular act has made instructional delivery a socially oriented act rather than the usual traditional face-to-face encounter (Dlamini & Ndzinisa, 2020). In the field of Technical Education for instance, not too many Universities offering the program could be placed on a pedestal of applause in Nigeria as noted by Dhawan (2020) due to their reliance on traditional methods of teaching.This is because Project Based Learning has taken lead and dominance among several instructional methods. The nature of Technical Education requires that workshop experience must compliment every theoretical class and as such face-to-face instructions become dominant and essential to recipients of the program (Ngure, 2022, Olakotan & Oke, 2021and Lemo & Olakotan, 2016).

Against this background, the declaration of the World Health Organization (WHO) of the COVID-19 outbreak a global pandemic (WHO 2020), took a new turn on specializations like Technical Educationand its dominance on face-to-face instructions was been challenged by this global outbreak. Similarly, the attendant effects of complete lockdowns to curtailthe spread of COVID-19 makes the matter even worse for face-to-face instructions. Complete shutdown of activities in schools across the globe was evident of the lockdowns (Malik,

Valiyaveettil, & Joseph, 2020; Bozkurt & Sharma, 2020). This took turn on access to Technical Education even when some other fields of learning found solace in digitized instructional delivery to avoid a total break of academic activities dependent of the COVID-19 lockdowns. Embracing digitized instructional delivery becomes pivotal as it ensures uninterrupted access to education (Alieto et al., 2024).

The focus of the United Nations Educational Scientific and Cultural Organization on Technical Education is on all-round inclusiveness such that transferable and technical skills are complemented through adoption of various learning approaches.

Digitized instruction came at the fore when all hopes of face-to-face interactions became dashed and unrealistic. Its emergence and adoption at this critical time enable academic sessions to be completed unabated and open doors for more discoveries in the academia.

Digitized instruction tends to enhance teacher's effectiveness and promote personal knowledge and skills through exploration of new technologies and as well stands at the pivot of transforming teaching and learning process in HEIs (Okoye et al, 2022; Ming-Hung, Huang-Cheng, & Kuang-Sheng, 2017; Holzberger, Philipp & Kunter, 2013). In the same vein, the emergence of digitized instruction has in no small measure transformed the landscape of teaching and learning through the application of intelligent digital aids, such as online games, educational websites like learning management systems, blackboards, and interactive whiteboards among others (Uugwanga & Namolo, 2024and Ebrahim, 2023).

This necessitated why Universities must invest in digital technologies to embrace online learning and adapt to the realities of the new normaland as well ensure learning beyond borders (Dlamini & Ndzinisa, 2020 and Hodges, Moore, Lockee, Trust & Bond, 2020). The need for digitizing instruction in Technical Education stem from the fact that it ushers arrays of opportunities which could be harnessed through converged learning, synchronous learning, and asynchronous learning. Converged learning merges the physical and virtual classrooms and it is independent of place. It could either be delivered face-to-face or using real-time synchronous video conferencing technology. This approach creates a better learning environment for students either on-campus or on online platforms at the same time (Fernandez, Ramesh & Manivannan, 2022).

In the case of synchronous learning, students have to be gathered for physical classroom interaction with the teacher. This mode encourages on-time feedback and learning on a fixed schedule(Fernandez, Ramesh & Manivannan, 2022 and Chauhan, 2017). On the other hand, asynchronous learning is a complete departure from synchronous because ideas and information are exchanged by learners without a recourse to simultaneous interaction. Learners learn through recorded videos, webinars, podcasts, and online training courses among others (Fernandez, Ramesh,& Manivannan, 2022; Chauhan, 2017). It cannot be overemphasized that digital technologies in the teaching and learning processes are sine-qua-non to effective teaching and learning in the 21st century (Popova et al., 2021; Barton & Dexter, 2020 and Chiu, 2020). Digital technology will in no doubt provide students with the wherewithal to solve various challenges (Baba, Iwuoha,& Alhassan, 2022).

Therefore, this research becomes imperative in ensuring that instructional delivery in Technical Education is digitally optimized. It is believed that tolling this path, would in no doubt improve teaching and learning in Technical Education in the face of any unforeseen circumstances. However, Elogbo & Akek (2019) noted that the adoption of digital technologies in TE will in no doubt improve the quality and employability of TE graduates. Also, Elbitar (2020) opined that for TE to meet the needs of the future there is need to embrace a sustainable digitized instructional delivery away from the dominant traditional approach.

The emergence of digitized instruction has brought a significant shift from the traditional method of teaching to a more decent, and efficient instructional delivery in Higher Educational Institutions (HEIs). Therefore, HEIs must consider changes in instructional delivery that require considerable digital competencies for all the stakeholders ((Serezhkina, 2021). The readiness of the Nigerian HEIs to embrace digital instructional delivery to match-up with their counterparts in the world over could be said to be impressive and encouraging (Adekoya, Fasae & Alade, 2024 and Akintunde, 2021). This is because instructional planning, instructional delivery, as well as managing the day-to-day academic and administrative activities are all encompassing in digitized instruction (Adekoya, Fasae & Alade, 2024;Akinwumi, Faremi, & Olatunbosun, 2020). Digitized instructional delivery has brought tremendous modifications to the essence of teaching and learning in TE (Ede, 2019). Digitized instructional delivery facilitates instructional exchange and interaction in the teaching and learning process as well as pivotal at both the planning and the presentation stage (Asogwa, Okanya, Eze, & Edozie, 2020).

Hence, effective digitized instruction in HEIs in general and TE in particular depends on literate and competent technology savvy teachers (Nikou & Aavakare, 2021; García & Cantón-Mayo, 2019). It must be noted that optimizing digitized instruction in HEIs has far-reaching implications on students as it meets their desires (Mahajan et al, 2023). Similarly, in a bid to meet the desires of the "Generation Z", it behooves on the HEIs to adopt sustainable methodologies laced by digitalization and the current practices in the world over (Elbitar, 2020).

Theoretically, the study found its footings on the Community of Inquiry (CoI) Framework (Garrison, Anderson, & Archer, 2001) and the Environmental Habit Theory (Prosser & Quigley,1949). The CoI as a theoretical foundation was justified by the event of COVID 19 and the need to sustain teaching and learning without a recourse to halting the process (Garrison, Anderson, & Archer, 2001). This foundation is premised on the adoption of digital instruction to meet the needs of students irrespective of distance. In the context of technical education, this can be operationalized by integrating project-based learning and simulation tools that allow students to apply theoretical concepts to real-world scenarios. Digital platforms, such as virtual labs or augmented reality (AR) applications would enable learners to experiment and solve problems in a safe yet realistic environment. This approach not only enhances technical proficiency but also cultivates critical thinking and problem-solving skills. On the other hand, the environmental habit theory (Prosser & Quigley, 1949) remains apt as the world of work is presently driven by technology, hence the need for the students to be trained in an environment similar to where they will subsequently work.
Thus, the discourse was guided by the following questions:

1. Should digitized instructional delivery be reckoned with in TE?
2. Why should digitized instructional delivery be reckoned with in TE?

The significance of the research question and the study's execution lies in the ability to define, enhance, and optimize an understanding ofoptimizing digital instructional delivery in technical education in the post COVID-19 era**.**

Methodology

Research Design

The qualitative method was employed to gather information from Technical Education experts, as it enables the exploration of meanings attributed to events based on individuals' experiences (Bogdan & Biklen, 2003).

Informants

The qualitative research involved a total of 21 participants, all of whom were Technical Education Experts from universities offering Technical Education in Southwest Nigeria. Each participant held a doctorate degree and was well-qualified to provide valuable insights for the study. Due to the specialized nature of the research, a purposive sampling method was employed, ensuring that only experts in the field participated, as they could accurately understand its complexities and provide relevant data for the research questions.

Instrument in Gathering the Data

The data collection instrument used was an interview protocol, with interviews conducted on an individual basis.

Data Collection Procedure

The study was conducted using qualitative semi-structured interviews that incorporated both face-to-face interactions and social media engagement (Yin, 2009). To enhance participants' confidence and ensure they were well-prepared, the interview questions were initially sent via email for preview before the interview.

Data Analysis Procedure

The data collected for this study were analyzed using content analysis, following Creswell's (2009) six-step qualitative analysis process. The coding process is presented in the table below:

Table 1: The main ideas of qualitative data analysis

SN	CODES	MAIN IDEAS
1	A1	Reckoning with Digitized instructional delivery in TE is appropriate and Apt
2	A2	Reckoning with Digitized instructional delivery in TE is not appropriate and Apt
3	A3	Digitized instructional delivery in TE will meet the needs of students
4	A4	Digitized instructional delivery in TE will not meet the needs of students

Ethical Considerations

Participants' confidentiality and anonymity were safeguarded throughout the study, as they provided informed consent before the interviews. They were notified in advance about their roles, responsibilities, and the purpose of the study. Additionally, participants were assured that their identities and the information they shared would be protected and used solely for research purposes. They also retained the right to withdraw from the interview at any point if they wished.

Validity

The interview questions were reviewed by three experts in the field of Technical Education from the Department of Vocational and Industrial Technology Education, Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, the Department of Vocational and Technical Education, Adekunle Ajasin University, Akungba, Ondo State, and the Department of Technology Education, Emmanuel Alayande University of Education, Oyo, Oyo State respectively.

Reliability

The interview questions were piloted with five doctorate degree holders in Technical Education to ensure clarity and prevent misunderstandings. However, the responses from these pilot interviews were not included in the study's final results.

Results and Discussion

Research Question 1

Should digitized instructional delivery be reckoned with in TE?

Table 2: Frequency of Responses on Digitized Instruction

Interview Questions	**Main ideas (category)**	**Participants/Responses**	**Code**	**Frequency of main Ideas**
Should digitized instructional delivery be reckoned with in TE	Reckoning with digitized instructional delivery in TE is appropriate and apt	**P1.** *Reckoning with digitized instructional delivery in TE is the best way to go* **P2.** *Reckoning with digitized instructional delivery in TE will revive our image* **P3.** *digitized instructional delivery in TE is now!* **P4.** *digitized instructional delivery in TE is very apt in a time like this* **P5.** *digitized instructional delivery in TE is very germane now* **P6.** *digitized instructional delivery in TE is the right way to go* **P7.** *digitized instructional delivery in TE should be reckoned with* **P8.***digitized instructional delivery in TE is long overdue* **P9.***digitized instructional delivery in TE is the way to go* **P10.** *digitized instructional delivery in TE is appropriate* **P11.***Reckoning with digitized instructional delivery in TE is highly apt* **P12.***Reckoning with digitized instructional delivery in TE is encouraging* **P13.***Reckoning with digitized instructional delivery in TE is very important* **P14.** *Reckoning with digitized instructional delivery in TE is a step in the right direction* **P15.***Reckoning with digitized instructional delivery in TE should be a top priority* **P17.** *digitized instructional delivery in TE should be embraced* **P18.** *digitized instructional delivery in TE to me is a good idea* **P19.** *digitized instructional delivery in TE should be reckoned with urgently* **P20.** *digitized instructional delivery in TE is a good step* **P21.** *digitized instructional delivery in TE is necessary*	A1	20
	Reckoning	**P16.** *digitized instructional delivery in TE*		

	with digitized instructional delivery in TE is not appropriate and apt	*should not be reckoned with because of funding*	A2	1

Table 2 showed the participants' responses to interview conducted on whether digitized instructional delivery in TE should be reckoned with. Twenty (20) out of the twenty-one (21) participants indicated that digitized instructional delivery in TE should be reckoned with (Code A1); while one (1) participant expressed that digitized instructional delivery in TE should not be reckoned with (Code A2).

Research Question 2

Why should digitized instructional delivery be reckoned with in TE?

Table 3: Frequency of Responses on why digitized instructional delivery be reckoned with in TE

Interview Questions	**Main ideas (category)**	**Participants/Responses**	**Code**	**Frequency of main Ideas**
y should digitized instructional delivery be reckoned with in TE?	Digitized instructional delivery in TE will meet the needs of students.	**P1.** *digitized instructional delivery in TE will boost students' enrolment* **P2.** *digitized instructional delivery in TE will encourage more students* **P3.** *digitized instructional delivery in TE will improve students' interest* **P4.** *digitized instructional delivery in TE will definitely meet the needs of the students* **P5.** *digitized instructional delivery in TE will further boost TE's image* **P6.** *digitized instructional delivery in TE will certainly meet the needs of the students* **P7.** *digitized instructional delivery in TE will make TE more relevant* **P8.***digitized instructional delivery in TE will encourage more students* **P9.***digitized instructional delivery in TE will be a new dawn for TE* **P10.** *digitized instructional delivery in TE will be a renewed hope* **P11.** *digitized instructional delivery in will improve concentration and mastery* **P12.***digitized instructional delivery in TE will surely meet the students' needs* **P13.***digitized instructional delivery in TE will surely meet the needs of the present age students* **P14.** *digitized instructional delivery in TEwill meet the needs of students beyond imagination* **P15.***digitized instructional delivery in TEwill meet the needs of students* **P17.** *digitized instructional delivery in TE will be a game changer* **P18.** *digitized instructional delivery in TE will help students in no small measure* **P19.** *digitized instructional delivery in TE will meet the present and future needs of students* **P20.** *digitized instructional delivery in TEwill be a major turning point in TE* **P21.** *digitized instructional delivery in TE will in no doubt meet the needs of students*	A3	20
	Digitized instructional delivery in TE will not meet the needs of students.	**P16.** *digitized instructional delivery in TE will be difficult to meet the needs of students in the absence of necessary equipment*	A4	1

Table 3 showed the participants' responses to interview conducted on why digitized instructional delivery be reckoned with in TE. Twenty (20) out of the twenty-one (21) participants indicated that why digitized instructional delivery be reckoned with in TE (Code A3). The twenty participants who stated reasons why digitized instructional delivery be reckoned with in TE based their reasons on the fact that digitized instructional delivery in TEwill meet the needs of the students while only one (1) participant expressed that digitized instructional delivery in TE will be difficult to meet the needs of students in the absence of necessary equipment (Code A4).

Discussion

Optimizing digital instructional delivery in TE has been the crux of this study, and as such experts in TE who participated in the study supported reckoning with digitized instructional delivery in TE.The findings of the study as shown in Table 2 showed that digitized instructional delivery in TE should be reckoned with. The participants based their positions on certain reasons. The major reason given was that "*reckoning with digitized instructional delivery in TE is apt and appropriate*" Twenty out of twenty-one participants were unanimous in their position, while only one participant who based his position on funding objected to reckoning with digitized instructional delivery in TE.

The findings from the qualitative study were in consonance with the position of Elbitar (2020) who emphasised that the adoption of digital instructional delivery in TE will meet the needs of students and the society at large.Similarly, the findings of the study were supported by Ede (2019) who noted that digitized instructional delivery has brought tremendous modifications to the essence of teaching and learning in TE. Furthermore, Asogwa et al (2020) also buttressed the findings of the study due to the fact that digitized instructional delivery facilitates instructional exchange and interaction in the teaching and learning process as well as pivotal at both the planning and the presentation stage. In the same vein, Elogbo & Akek (2019) noted that the adoption of digital technologies in TE will in no doubt improve the quality and employability of TE graduates.

Similarly, from the findings revealed in Table 3 on why digitized instructional delivery be reckoned with in TE, also, the participants based their positions on certain reasons. The major reason given was that "*digitized instructional delivery in TE will meet the needs of students*" Twenty out of twenty-one participants were unanimous in their position, while only one participant who based his position on unavailability of equipmentaffirmed that digitized instructional delivery in TEwill not meet the needs of students. The findings are corroborated by the positions of Ming-Hung, Huang-Cheng, and Kuang-Sheng (2017) as well as Holzberger, Philipp and Kunter (2013) who posited that digitized instruction tends to enhance teacher's effectiveness and promote personal knowledge and skills through exploration of new technologies. Similarly, the positions of Ugwanga & Namolo (2024) as well as Ebrahim (2023) affirmed thatdigitized instruction has the capacity to transform the landscape of teaching and learning. In the same vein, Adekoya, Fasae & Alade (2024) as well as Akintunde (2021) noted that embracing digital instructional delivery in HEIs will enable TE in Nigeria to match-up with their counterparts in the world over.Also, the submission of Mahajan et al (2023) lend credence to the need for reckoning with digital instructional delivery in TE due to the far-reaching implications it will havein meeting the desires of students.

Conclusion

Digital instructional delivery will etch outstanding advancementin TEfor the now and in the future if fully optimized. These and many more remain the claims of TE experts who participated in the study.

Recommendations

Based on the findings of this study, it is hereby recommended that educators in the field of technical education should toll the part of digitizing instructional delivery to enhance sustainable post-COVID 19 pedagogical needs of students.

Limitations of the Study

The results emanating from this research reflects the experiences and knowledge of the participants on optimizing digital instructional delivery in technical education in the post COVID-19 era, hence the results can be generalized or limited to an extent that qualitative data can.

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