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Virtual Classroom Competencies Required by Electrical/Electronic Technology Lecturers in Colleges of Education for Instruction in the Era of Covid-19 in North East Nigeria

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Abstract: ***The study aimed to identify the virtual classroom competencies needed for instruction in the COVID-19 period in North East Nigeria by Electrical/Electronic Technology lecturers in colleges of education. Descriptive survey research design was employed in the study. Two research questions and hypotheses guided the study.76 participants in total comprising 34 ICT unit employees and 42 electrical/electronic technology education lecturers from five colleges of education in Nigeria's North East. Sampling of the respondents were not observed because the total population was used. The research's instrument was a structured questionnaire created by the researcher under the name Questionnaire for Virtual Classroom Competencies Required by Lecturers in Colleges of Education (QVCCRTCE). Three professionals validated the instrument, and using Cronbach Alpha, a reliability index of 0.82 was established. The questions in the study were answered using the mean statistic, and the null hypotheses tested using t-test at 0.05 confidence level. According to study results, lecturers of electrical and electronic technology must be proficient in a variety of virtual classroom tools, including video conferencing, online whiteboards for real-time collaboration, instant messaging, participation monitoring, breakout rooms, screen sharing, file annotations, video playback, quizzing tools, and tools for movable partition walls. According to the results, colleges of education should work with the ICT departments in the schools to give electrical/electronic technology education instructors more training so they can become familiar with the many tools included into the virtual classroom interface and make effective use of them. Additionally, the government should make sure that the school's online platforms are regularly evaluated to determine whether they still suit modern demands.***

Keywords: Virtual Classroom, Electrical/Electronics, Competencies, COVID-19, Colleges of Education.

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1. INTRODUCTION

In Sub-Saharan Africa, Nigeria was among the earliest to identify cases of COVID-19 (coronavirus), and it has since put rigorous controls in place to stop the virus's spread. A rare disease known as COVID-19 came to light in December 2019 when it was found to be the underlying cause of pneumonia cases reported in patients hospitalized to Wuhan, China, hospitals (Munster et al. 2020; Zhu et al. 2020). People can contract this illness by coming into close contact with others who are sick with the virus through airborne zoonotic droplets, and by coughing or sneezing directly onto them (Kumar et al. 2020). COVID-19, commonly known as the coronavirus, was formally dubbed a pandemic by the World Health Organization (WHO) on March 12, 2020. (WHO, 2020). The majority of countries around the world, including Nigeria, closed their educational facilities because of this pandemic. UNESCO have it that school began to close as the cases of COVID-19 became sored high each day and in "April 2020" school were forced to shut-down all activities and remain close, this measure affected nearly 1.6 billion children in 194 countries (UNESCO, 2020). All schools in Nigeria were ordered to close in March 2020 by the Federal Ministry of Education, and they didn't start opening again until October of that same year (Obiezu, 2020).

Nigerian education has been impacted by the COVID-19 pandemic (Kazeem, 2020). College officials needed to develop tactics that will ensure continuous learning even during the lockdown because the Colleges of Education (Technical) were closed (Olurounbi & Bala-Gbogbo, 2020). Some privately held tertiary schools in Nigeria soon switched from traditional face-to-face instruction to distance learning. A growing number of institutions immediately shifted to online instruction as the period of total lockdown dragged on. Since they received virtual training on how to use distance learning tools, both lecturers and students had to quickly adapt to the new form of instruction. It was difficult for lecturers and students to adjust to the virtual classroom and keep up the basic level of communication necessary to foster learning and development. It was challenging to transition to remote learning in a short amount of time, particularly in a developing nation like Nigeria where cutting-edge technology has not been fully incorporated into the educational system (Ebohon, Obienu, Irabor, Amadin & Omoregie, 2021). Because COVID-19, which has altered how teaching and learning occur, shows no signs of slowing down anytime soon and seems to have a lasting influence, a virtual classroom is necessary.

A virtual classroom is an online learning space that enables real-time communication between the lecturer and the students while they engage in educational activities (Bhakta and Dutta, 2016). In other words, the virtual classroom is a collaborative online arena where the tutor and students work side by side (Buckenmeyer, 2010). In contrast, a virtual classroom in this study is an online setting for teaching and learning where students and lecturers can present course materials, engage and converse with other participants, and collaborate in groups.

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Typically, videoconferencing is used for these encounters. The participants have the resources necessary to carry out group and solo projects, as well as presentations of educational material in various formats. The lecturer has a particularly significant role in this form of engagement as the moderator who directs the learning process and promotes group activities and conversations. The main characteristic of a virtual classroom is that it operates in a real-time, synchronous environment. While asynchronous, pre-recorded content can be seen as part of online courses, virtual classroom environments feature live interaction between instructors and students (Badia, Meneses and Sigales, 2013).
By satisfying the demands of the learners in terms of social connection and psychological safety, synchronous virtual classrooms have the potential to significantly enhance online learning. They can also establish a new benchmark for the learning process that goes beyond the confines of the traditional classroom and instructional techniques (Bhakta, & Dutta) (2016). Synchronous virtual learning takes place in a virtual learning environment, such through mobile connections, online seminars, or other types of online communication. Participants and the lecturer can engage in one-on-one or group learning formats delivered through lectures, conversations, and demonstrations in the synchronous environment. Learning is carried out by a lecturer who instructs in real time using the instruments of the appropriate virtual learning environment, among which is the video or audio conference link, in either group or one-on-one mode depending on the particular scenario. Because of the possibilities provided by the virtual learning environment, participants can connect and converse simultaneously (Szeto & Cheng, 2016).

According to Dhawan (2020), there are many potential available when using the virtual classroom, particularly when doing so in conjunction with learning management systems or self-study platforms. The synchronous virtual classroom, in contrast to asynchronous learning environments, enables immediate feedback, close lecturer-student interaction, and fun activities to boost engagement and motivation. Immediate communication encourages the development of group relationships and a sense of community. Even though the experience of teaching and learning in a virtual classroom is comparable to that in a physical one, it nevertheless necessitates new pedagogical strategies and a redesign of the instructional model used by lecturers who have graduated from Colleges of Education (Technical).

After primary and secondary education, College of Education (COE) is in the third category of higher or tertiary education system in Nigeria. The universities, mono/polytechnics, and Colleges of Education (Technical) all make up higher education, often known as tertiary education. Since the Federal Government of Nigeria established Colleges of Education (Technical) (Technical) to help people acquire the practical skills, fundamental knowledge, and pedagogical skills required to teach technical and vocational subjects in secondary school in order to achieve the goals of technical education, they differ from conventional Colleges of Education (Technical) (National Commission for Colleges of Education (Technical) [NCCE], 2008). The technical courses offered by Colleges of Education (Technical) (Technical) include plumbing, painting, furniture making, machine woodworking, welding, and automobile mechanics, Carpentry and Joinery, Building, and Electrical/ Electronics, (Federal Government of Nigeria, [FGN], 2013).

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Skills, knowledge, and attitudes that result in higher performance are referred to as competencies. The motor domain/unit of competency, knowledge, intellect/cognitive ability, and attitudes, the character necessary for successful performance, are all referred to as skills. Each competency-based learning objective is distinctly specified and defined (Raja & Nagasubramani, 2018). Competency is defined as the information, abilities, attitudes, and judgment that are typically necessary for the successful completion of a task, according to Olaitan and Ali (2007). In this context, judgment refers to the application of numerous cognitive and affective skills in the process of determining the requisite degree of competency. Competencies were defined by Ajayi (2012) as personal traits or skills that are essential for success at work. However, in this work, competency is defined as the capacity to use virtual classrooms for teaching and learning situations.

The skills needed by Electrical/Electronic Technology lecturers to succeed in virtual classroom activities in Colleges of Education (Technical) vary depending on the complexity and type of activity, as having the necessary skills, interests, aptitudes, patience, personalities, and other human or physical qualities will help them (Egbita, 2006). It is a prevalent misconception that competency development necessitates low intelligence. In actuality, the lecturer/learner faces enormous problems in integrating practical work, theoretical domains, common sense, good power observation, and courage in addition to the virtual classroom activities.

Statement of the Problem

Due to the lack of widely accessible internet, Colleges of Education (Technical) in North East Nigeria have restricted access to internet services. Across the nation, lecturers who lack dependable technology, internet connectivity, or both find it difficult to engage in digital teaching and learning. The hurried transition to online teaching and learning without adequate planning, training, or bandwidth may leave users with a negative experience that hinders long-term growth. To ensure adequate and efficient use of the virtual environment for the purpose of teaching and learning in North East Nigeria, it is necessary to establish the skills needed by electrical and electronic technology lecturers while using the virtual classroom in Colleges of Education (Technical).

Purpose of the Study

The main purpose of the study was to determine the virtual classroom competencies required by Electrical/Electronic Technology lecturers in Colleges of Education for instruction in the era of COVID-19 in North East Nigeria. Specifically, the study sought to determine:

1. The virtual classroom tools competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic
2. The virtual classroom competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic

Research Questions

1. What are the virtual classroom tools competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic
What are the virtual classroom competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic

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Hypotheses

H_{O1}: There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology units staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic

H_{O2}: There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology units staff in Colleges of Education on the virtual classroom competencies required by lecturers in the era of COVID-19 pandemic

2. METHODOLOGY

The study which was conducted in North East Nigeria adopted a descriptive survey research design. North East, Nigeria is located within latitude 6.26^0 East and longitude 4.92^0 North East of the equator. The zone comprises of Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe States. The population of the study was 76 which comprised of 42 lecturers and 34 ICT unit staff in the five Colleges of education North East, Nigeria as Borno state was exempted due to insecurity reasons. There was no sampling; hence, the whole population was used for the study due to the manageable size of the population. The instrument used for data collection was a structured questionnaire developed by the researchers tagged: "Questionnaire for Virtual Classroom Competencies Required by Lecturers in Colleges of Education (QVCCRTCE)". The responses on the questionnaire were structured on a 5-point Rating scale of Highly Required (HR) = 5, Required (R) = 4, Moderately Required (MR) = 3, Slightly Required (SR) = 2, and Not Required (NR) = 1. The questionnaire was validated by three validates from the Department of Electrical Technology Education, Modibbo Adama University, Yola, Adamawa State. After conducting a trial test of the instrument on five lecturers and four ICT unit staff in Federal College of Education (Technical), Bichi in Kano State a reliability index of 0.82 was obtained using Cronbach Alpha method. Data for the study was collected by the researchers with help of five research assistants. Mean statistic was used to answer the two research questions of the study while t-test was used to test the null hypotheses of the study. All items with mean score of 3.5 and above were considered "Required" and all items with less than 3.50 were considered "Not Required". In deciding for the hypothesis, were the p-value was greater that the α-value, the null hypothesis was considered "Significant" and if otherwise "Not Significant".

3. RESULTS

Research Question One: What are the virtual classroom tools competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic?

Table 1: Mean and Standard Deviation of Lecturers and ICT Unit Staff on the Virtual Classroom Tools Competencies Required

		n_t =42	n_i= 34	n = 76		
S/NO	**ITEMS**	$\bar{x}_t$	$\bar{x}_i$	$\bar{x}_G$	**σ**	**Remark**

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1.	Video conferencing	3.90	3.88	3.89	0.31	Required
2.	Online whiteboard for real-time collaboration	4.86	4.82	4.84	0.37	Required
3.	Instant massaging tool	3.62	3.59	3.61	0.59	Required
4.	Participation control tool	3.90	3.88	3.89	0.31	Required
5.	Breakout rooms tool	3.81	3.76	3.79	0.62	Required
6.	Screen sharing tool	3.79	3.76	3.78	0.42	Required
7.	File annotations tool	3.55	3.53	3.54	0.50	Required
8.	Video playback tool	4.07	4.06	4.07	0.41	Required
9.	Quizzing tool	3.79	3.76	3.78	0.58	Required
10.	Tools for movable partition walls	3.79	3.76	3.78	0.42	Required
	Group Mean			**3.90**		**Required**

$\bar{x}_t$= Mean of Lecturers, $\bar{x}_i$ = Mean of ICT Unit Staff, $\bar{x}_G$= Grand Mean, σ = Standard deviation n_t = Number of Lecturers, n_i = Number of ICT Experts, n = Total Number of Respondents In light of the COVID-19 epidemic, Table 1 presents the responses on the virtual classroom tool abilities needed by lecturers in electrical and electronic technology education. The respondents' mean responses ranged between 3.54 and 4.84, and their corresponding standard deviation likewise ranged between 0.31 and 0.62, indicating that items 1 through 10 are virtual classroom tools competencies needed by lecturers in electrical/electronic technology education. The respondents demonstrated that all of the abilities indicated in Table 1 are virtual classroom tools competencies needed for Electrical/Electronic Technology lecturers in the wake of the COVID-19 pandemic, with a group mean of 3.90.

Research Question Two: What are the virtual classroom competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic?

		n_t =42	**n_i= 122**	**n = 164**		
S/NO	**ITEMS**	$\bar{x}_t$	$\bar{x}_i$	$\bar{x}_G$	**σ**	**Remark**
11.	Ability to multitask in virtual classroom environment	3.95	3.94	3.95	0.22	Required
12.	High level of the virtual classroom technology mastery	3.79	3.76	3.78	1.49	Required
13.	Ability to create a comfortable learning environment to students using the virtual platform	3.81	3.76	3.79	0.62	Required
14.	Ability to build rapport with the students using the virtual classroom platform	3.86	3.82	3.84	0.49	Required
15.	Mastery of the subject matter before using the virtual classroom platform	4.24	4.21	4.22	1.55	Required
16.	Ability to communicate effectively with students	4.19	4.12	4.16	0.88	Required
17.	Effective time management	3.95	3.94	3.95	0.22	Required
18.	Ability to calm/reassure panicking students	3.86	3.82	3.84	0.37	Required
19.	Ability to evaluate students' performance	4.05	4.03	4.04	0.20	Required

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	form feedback					
20.	Ability to direct online discussion without distraction	3.90	3.88	3.89	0.45	Required
	Group Mean			**3.95**		**Required**

$\bar{x}_t$= Mean of Lecturers, $\bar{x}_i$ = Mean of ICT Unit Staff, $\bar{x}_G$= Grand Mean, σ = Standard deviation n_t = Number of Lecturers, n_i = Number of ICT Experts, n = Total Number of Respondents The answer on the virtual classroom skills needed by lecturers in electrical/electronic technology education in light of the COVID-19 pandemic is shown in Table 2. With mean responses ranging between 3.78 and 4.22 and their corresponding standard deviations ranging between 0.20 and 1.55, the respondents stated that items 11 through 20 are virtual classroom competences required for lecturers in electrical/electronic technology education. The respondents demonstrated that all of the elements presented in Table 1 are virtual classroom competences needed by lecturers in electrical/electronic technology education in light of the COVID-19 curriculum, with a group mean of 3.95.

Hypothesis One: There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology unit's staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic

Table 3: t-test Statistical Analysis of Difference between the Mean Responses of the Lecturers and ICT Unit Staff Virtual Classroom Tools Competencies Required

Respondents	**N**	**Mean**	**σ**	**df**	**P – value**	**Remark**
Lecturers	42	3.91	0.19			
				74	0.575	Not Significant
ICT Unit Staff	34	3.88	0.19			

P >0.05 N= Number of respondents, σ = Standard Deviation
The outcome of testing Hypothesis 1 at 0.05 level of significance is shown in Table 3. A p-value of 0.575 was recorded. Since the p-value is higher than the α-value of 0.05, it is assumed that there is no significant difference between the mean responses of lecturers in electrical and electronic technology education and those of the ICT unit in colleges of education regarding the skills needed by electrical and electronic technology lecturers in the event of the COVID-19 pandemic with regard to virtual classroom tools. Therefore, the HO1 null hypothesis is supported.

Hypothesis Two: There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology unit's staff in Colleges of Education on the virtual classroom competencies required by lecturers in the era of COVID-19 pandemic

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Table 4: t-test Statistical Analysis of Difference between the Mean Responses of the Lecturers and ICT Unit Staff Virtual Classroom Tools Competencies Required

Respondents	N	Mean	σ	df	P – value	Remark
Lecturers	42	3.96	0.35			
				74	0.726	Not Significant
ICT Unit Staff	34	3.93	0.40			

P >0.05 N= Number of respondents, σ = Standard Deviation

The outcome of testing Hypothesis 2 at 0.05 level of significance is shown in Table 4. A p-value of 0.72 was obtained. Since the p-value is higher than the α-value of 0.05, it is implied that there is no significant difference between the mean responses of lecturers in the fields of electrical and electronic technology education and the ICT unit staff at colleges of education regarding the skills needed by lecturers in virtual classrooms during the COVID-19 pandemic. Therefore, the HO2 null hypothesis is supported.

Findings of the Study

1. Virtual classroom tools competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic include: video conferencing, online whiteboard for real-time collaboration, instant messaging, participation control, breakout rooms, screen sharing, file annotations, video playback, quizzing tools, and tools for movable partition walls
2. Virtual classroom competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic include ability to: multitask in virtual classroom environment, create a comfortable learning environment to students using the virtual platform, build rapport with the students and communicate effectively, high level of the virtual classroom technology mastery and mastery of the subject matter, and effective time management.
3. There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology units staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic
4. There is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology unit's staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic

Discussion of Findings

According to the study's findings, lecturers in the field of electrical and electronic technology will need to be skilled in using a variety of virtual classroom tools, including video conferencing, an online whiteboard for real-time collaboration, instant messaging, participation monitoring, breakout rooms, screen sharing, file annotations, video playback, quizzing tools, and tools for movable partition walls. The results are in line with those of Falloon (2011a), who in a study on Moore's theory of transactional distance and its applicability to the use of a virtual classroom in postgraduate online lecturer education reported that the virtual classroom is a setting where teaching and learning take place, necessitating the use of various tools to facilitate effective communication and the transfer of

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skills and knowledge between lecturers and students. The presence of the manipulative tools in the virtual classroom will help the lecturers and students alike in the understanding of individual needs and hence work towards its achievement. The finding is further supported by Bhakta and Dutta (2016) who reported that the Information Communication Technology (ICT) have made the impossible to be possible as the new technology has given rise to new skills and ideas which will enable the lecturer to fit into ever changing world. Bhakta and Dutta maintained that the education system is being faced with numerous changes and as such lecturers must braze up for the new task and challenges by acquiring the necessary skills and attitudes in on-line activities. The finding of the Study revealed that virtual classroom competencies required by Electrical/Electronic Technology Education lecturers in the ear of COVID-19 pandemic include ability to: multitask in virtual classroom environment, create a comfortable learning environment to students using the virtual platform, build rapport with the students and communicate effectively, high level of the virtual classroom technology mastery and mastery of the subject matter, and effective time management. The finding is in agreement with Falloon (2012) who conducted a study titled "inside the virtual classroom: student perspectives on affordances and limitation" reported that, the virtual environment requires a lecturer to be versatile in all aspect as the may serve as technical support for themselves in a situation whereby ICT experts are not readily available. The virtual classroom has several tools and interfaces and a lecturer is expected to possess competencies that that will enable them use the virtual classroom effectively. The findings is also supported by the reports of Bhakta and Dutta (2016), Buckenmeyer (2010), and DeCoito and Richardson (2018) who in their various submission asserted that beyond the availability of computers in the classroom, learners have to collaborate in the learning activities. Collaborative learning refers to when students cooperate to accomplish a shared objective, share opinions, define concepts, or come up with solutions to issues. Cooperation in the improvement of abilities is made possible. The focus is on interaction in which shared understandings are raised for debate and precisely refined by examining the disparities between the participants' levels of expertise, competence, and position. The finding of the Study revealed that there is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology units staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic. The finding is in agreement with Falloon (2011b) who explored the virtual classroom to identify what students need to know (and lecturers should consider) submitted that only lecturers who are devoted to understand the working and analogy of the virtual classroom. To further buttress the finding, Khan and Nawaz (2013) opined that in using e-Learning systems for higher education in developing countries there are limited knowledge on the gadgets and facilities used. Khan and Nawaz maintained that before the advent of COVID-19, many developing countries where finding it difficult to integrate ICT in the teaching activities as the most lecturer lack the competencies and knowledge to use the platforms effectively and as such the need for proper evaluation of the skills possessed by lecturer in online teaching and learning. The finding of the Study revealed that there is no significant difference in the mean response of Electrical/Electronic Technology Education lecturers and Information and Communication Technology unit's staff in Colleges of Education on the virtual classroom tools competencies required by Electrical/Electronic Technology lecturers in the ear of COVID-19 pandemic. The finding is in agreement with Mukhtar, Javed, Arooj and Sethi

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(2020) who studied the advantages, limitations and recommendations for online learning during COVID-19 pandemic era reported that irrespective of the field of study, lecturers are demanded to equip themselves with the right attitude toward the implementation of the online learning especially the virtual classroom platform. Bhakta and Dutta (2016) and Falloon (2012) maintained that the virtual classroom habits are in no less than the traditional classroom. Inside the virtual classroom lecturer are to exhibit characters that reflect the physical present all through the duration of the study.

4. CONCLUSION

Based on the finding of the study, it was concluded that Electrical/Electronic Technology lecturers in Colleges of Education in North East Nigeria required virtual classroom tools competencies and virtual classroom competencies for instruction in the era of COVID-19.

Recommendation

The study recommended the following based on the findings of the study:

1. Colleges of Education should partner with the ICT Units in the schools to should provide more training to Electrical/Electronic Technology Education lecturers in order to expose them to the various tools imbedded in the virtual classroom interface for proper utilization
2. Government should ensure that Electrical/Electronic Technology Education lecturers are given in-service training for effective update of their practical skills possessed in online teaching.
3. Government should ensure periodic evaluation of the online platforms in the schools to ensure that they meet up to the need of the changing times
4. Electrical/Electronic Technology Education lecturers should engage themselves in self-development programme through online and offline video, journal and books

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