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Influence of Teacher's ICT Skills on Employability of Student's Specializations in Electrical Installations and Maintenance Works in Nigeria

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Abstract: This study investigated the influence of teachers' ICT skills on employability of students' specializations in electrical installations and maintenance works in Nigeria using correlational research design. The study was guided by two research questions and two null hypotheses tested at .05 level of significance in the study. The study population consisted of 102 respondents, made up of teachers from technical colleges in Edo and Delta States. Since the total population of Electrical Installation and Maintenance Works teachers in Edo and Delta States owned technical colleges was relatively small and manageable (102), the study adopted a census sampling technique. Therefore, all Electrical and Electronic teachers in the technical colleges in Edo and Delta States were included in the study. Data were collected using a questionnaire titled Influence of Teachers' ICT Skills on the Employability of Students' Specialization in Electrical Installation and Maintenance Work. Analysis of the data involved mean, standard deviation, and linear regression analysis. The study revealed that basic computer literacy skill, internet and research skill, digital teaching skill, coding and programming skill, data analysis and management skill, and troubleshooting and maintenance skill are the information and communication technology skills required by technical college teachers for effective implementation of the Electrical Installation and Maintenance Works curriculum for employability in Edo and Delta States, Nigeria. Based on the findings, it was recommended among others that the management of technical colleges and curriculum developers should strengthen training programs that enhance teachers' proficiency in advanced ICT tools such as simulation software, IoT-based systems, and multimedia instructional platforms. This will ensure that teachers can effectively integrate modern technologies into classroom and workshop instruction to improve students' employability.

Keywords: Technical college, electrical installation and maintenance works, and ICT skills

1.   Introduction

Technical Vocational Education and Training (TVET) equips individuals with practical skills, knowledge, and attitudes for specific trades through hands-on, industry-relevant training, with the goal of improving employability and bridging the gap between education and labor market needs. It contributes to national development by supplying skilled labor, promoting innovation, and supporting economic growth, particularly in developing economies, while also enabling adults to update their skills and adapt to technological changes. Oviawe et al. (2017) emphasized that TVET develops youths' manipulative, cognitive, and attitudinal skills for effective workplace performance. Similarly, National Board for Technical Education (NBTE) (2018) stated that TVET produces skilled, self-reliant craftsmen and technicians who can apply scientific knowledge to solve practical problems, operate and maintain technical systems, and pursue further studies in engineering and technology. Technical education also strengthens youths' basic skills, competence, and understanding

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of industrial and business processes, preparing them for self-reliance after graduation (Oviawe & Uwameiye, 2019), these are been achieve in technical colleges.

Technical colleges play a vital role in addressing Nigeria's skills gap by producing skilled craftsmen and technicians with practical, industry-relevant skills, thereby reducing unemployment and underemployment and supporting national development. Established by the Federal and State Governments, these post-basic institutions implement vocational education programmes that combine general education with science, trades, and modular courses. Ugwu et al. (2024) emphasized that technical colleges are central to Nigeria's vocational education system, serving as spaces where theoretical knowledge and practical skills are integrated. Technical colleges operate three levels NTC I, NTC II, and NTC III and are designed to equip students with the knowledge, understanding, and skills needed for gainful employment or self-reliance, thus fostering innovation, entrepreneurship, economic growth, and technological advancement.

In Nigeria, technical colleges offer a wide range of trades across engineering, construction, agriculture, business, and information technology to meet the evolving demands of the workplace and society. Engineering trades include mechanical, electrical, and civil fields, while construction trades cover areas such as carpentry and joinery, plumbing, and electrical installation and maintenance. These trades are organized into departments and further broken down into specialized subjects, such as Electrical Installation and Maintenance Works, Radio, Television and Electrical Works, and Appliance Repairs within the Electrical Department.

Electrical Installation and Maintenance Work (EIMW) is a trade subject in technical colleges under Electrical and Electronic Technology, covering domestic and industrial installation, cable joining and repair, and electrical machine winding. Advances in internet, telecommunications, and security technologies have increased the complexity of the field, creating the need for ICT-equipped teachers and modern instructional methods to effectively train students who complete about three years of study. In line with NBTE objectives, EIMW professionals are expected to install and maintain electrical systems and appliances, carry out wiring and fault detection, and interpret technical drawings (NBTE, 2018). However, the abstract nature of the subject often limits students' understanding when ICT-supported practical instruction is lacking.

Zhou et al. (2026) emphasized that achieving learning outcomes and employability or self-reliance requires comprehensive theoretical and hands-on training using up-to-date ICT tools, supported by skilled teachers and adequate facilities. Technical college teachers, who typically hold qualifications such as NCE (Technical), B.Tech, or HND, are responsible for both practical and theoretical instruction and possess the required teaching competencies (Badmus, 2023). Nevertheless, many technical institutions in Nigeria face inadequate and outdated workshop facilities, which encourage reliance on conventional teaching methods and limit ICT integration. This deprives students of exposure to modern, real-world experiences such as the Internet of Things (IoT). Consequently, ICT competence among EIMW teachers is essential for fostering innovation and preparing students for the demands of the 21st century electrical installation and maintenance industry. However, it appears that some teachers of EIMW lack the requisite ICT skills needed for effective instruction in a technology-driven environment, a gap that may contribute to professionals' inadequate competence in meeting industrial ICT demands. This underscores the urgent need for EIMW teachers to embrace ICT integration in their teaching pedagogy.

Information and Communication Technology (ICT) involves the use of computers, telecommunications, and digital systems for processing and exchanging information and plays a vital role in education, industry, and other sectors. UNESCO (2023) described ICT as a broad range of digital tools that support communication, learning, and information exchange in a rapidly evolving technological context. As industries become increasingly digitized, the demand for professionals who can integrate ICT with installation and maintenance systems continues to grow. Ahmadu et al. (2025) noted that Nigeria's economic growth largely depends on a workforce equipped with ICT skills alongside professional competencies. Therefore, for Nigerian institutions to produce a skilled and productive workforce, teachers must be adequately trained in relevant ICT skills, including basic computer literacy, internet and research skills, digital teaching skills, programming, data management, and troubleshooting and maintenance skills.

Basic computer literacy skills are essential for effective ICT integration in technical colleges and have a direct influence on employability. These skills include word processing, spreadsheet and presentation applications, internet navigation, and basic troubleshooting, all of which support modern teaching and learning. Technically competent teachers can integrate digital tools such as computer-aided design (CAD), automation software, and virtual simulations to enhance students' understanding of industry-relevant technologies. In addition, EIMW teachers require strong internet and research skills to effectively implement the curriculum and improve professionals' employability. Kashweka (2024) reported that ICT-enhanced instruction in electrical installation and maintenance work, including virtual circuit simulations and online troubleshooting tools, significantly improved students' problem-solving ability and technical accuracy. Similarly, Odede (2022) found that internet and research skills enable teachers to access, evaluate, and apply digital resources, use academic databases, and integrate web-based learning tools for effective instruction. These competencies allow teachers to expose students to current industry practices, global standards, and continuous learning opportunities, while also promoting safe and ethical use of online information, intellectual property awareness, and responsible digital participation, which are critical for employability in the 21st century (UNESCO, 2023).

Digital teaching skills are essential for technical college teachers to effectively deliver ICT-integrated instruction and enhance the employability of Electrical Installation and Maintenance Work (EIMW) professionals. These skills include the use of learning management systems, virtual laboratories, multimedia resources, and interactive teaching software to improve student engagement and practical learning. Teachers who are digitally competent can simulate real-world technical situations, provide virtual hands-on training, and expose students to industry-relevant digital tools. Egbon and Nlebem (2024) found that strategies such as teacher training, work-based learning, effective instructional methods, and school industry collaboration significantly improve students' practical skills acquisition in EIMW by bridging the gap between theory and practice. Similarly, Ezugu et al. (2023) reported that EIMW teachers required improvement across all identified technical and pedagogical skills, including solar photovoltaic installation, use of AutoCAD for working drawings, and electrical fault diagnosis, with no significant difference between teaching and non-teaching staff in perceived skill needs.

Coding and programming skills are becoming increasingly important for technical college teachers, as they support the integration of automation, computational thinking, and digital technologies into technical training, thereby enhancing the employability of EIMW professionals. These skills include teaching programming languages such as Python and Java and applying coding to areas like robotics, artificial intelligence, embedded systems, and smart IoT applications. Teachers with programming expertise can develop students' problem-solving abilities, algorithmic thinking, and practical software skills. Durrell (2020) found that integrating programming, IoT, and automated control systems into vocational curricula significantly improved students' troubleshooting skills and technical adaptability. Similarly, Choi et al. (2020) noted that such integration equips students with interdisciplinary skills increasingly demanded by employers. Sadiat et al. (2024) further emphasized that incorporating coding into EIMW education improves employability by strengthening students' technical knowledge and adaptability. Ayatullah (2023) reported that EIMW students require a wide range of skills for self-employment in domestic and industrial installations and machine winding, while Ogbuanya and Tongshuwal (2021) observed that although teachers were familiar with ICT tools, the relationship between teacher ICT use and student employability outcomes was weak or non-significant in some cases.

Data analysis and management skills are vital for technical education teachers, as they support effective information handling, decision-making, and data-driven instruction. Proficiency in tools such as spreadsheets, databases, statistical software, and data visualization enables teachers to equip students with practical problem-solving skills needed in technology, manufacturing, and business-related fields. Students trained in these competencies gain a competitive advantage in electrical and electronic installation and maintenance works by combining traditional skills with modern, data-based knowledge. Without data analysis skills, teachers may struggle to prepare students for industries driven by big data, artificial intelligence, and predictive modeling. In vocational education, where curricula must align with labor market needs, teachers' ability to analyze and manage data ensures that students acquire employer-relevant competencies. Krüger et al. (2025) further noted that such targeted, data-informed instruction enhances students' ability

Troubleshooting and maintenance skills are essential in technical colleges for sustaining ICT tools and preparing students for real-world problem-solving. These skills involve diagnosing hardware and software faults, managing systems, and ensuring the effective use of digital teaching equipment (Akinyemi & Salami, 2023). Teachers who possess strong troubleshooting abilities can reduce equipment downtime, support hands-on learning, and model analytical and systematic problem-solving skills valued. Strengthening these competencies among teachers is therefore crucial for producing a skilled workforce with practical ICT abilities for employability and self-reliance. However, several studies report contrary findings. Saidu et al. (2025) found that despite students having basic ICT skills, inadequate teacher competence and poor infrastructure in Rivers State hindered effective ICT application in electrical technology training. Similarly, Wawo et al. (2021) observed that most technical teachers in Kano State lacked proficiency in key ICT operations, limiting effective implementation of the EIMW curriculum, while Yusof et al. (2023) reported inadequate virtual classroom competencies among electrical installation teachers in Yobe State. In contrast, Anjani et al. (2024) noted that students trained by skilled instructors are more adaptable and better prepared to handle real-life challenges, enhancing their employability.

Employability refers to the set of skills, knowledge, and personal attributes that enable an individual to gain employment, maintain a job, and adapt to career changes in a competitive labor market. It is not just about securing a job but also about developing the ability to progress in a career through continuous learning and adaptability. Fugate, et al. (2021) described employability as a psycho-social construct that includes individual characteristics, adaptability, and career identity, all of which contribute to job acquisition and career success in a dynamic labor market. Technical College teachers Integrating the afore-mentioned ICT skills in their teaching and learning at this level of education would help in achieving the objectives of EIMW according to NBTE in a more reformed way that will help students cope in today's digital driven labour market particularly electrical installation and maintenance work whose services cut across domestic and industrial labour.

2. Statement of the Problem

In the 21st century, employability in Electrical Installation and Maintenance Works (EIMW) increasingly depends on Information and Communication Technology (ICT) skills. Modern electrical systems rely on automation, smart technologies, programmable logic controllers (PLCs), and IoT applications, making ICT competencies essential for a

skilled workforce (Buabeng-Andoh, 2012). However, many Nigerian technical college EIMW professionals struggle to secure or retain employment due to skill gaps between training and industry requirements, raising concerns about their readiness for self-reliance and the evolving labor market in Edo and Delta States. Challenges include outdated teaching methods, limited digital infrastructure, and insufficient teacher training in ICT. Technical teachers are key to shaping students' skills, yet studies show many lack proficiency in areas such as troubleshooting, coding, data management, and digital instruction (Akinyemi & Salami, 2023), which negatively impacts professionals' employability. Therefore, this study investigates the ICT competencies technical teachers need to effectively prepare EIMW students for employment in today's technology-driven economy in Nigeria.

3.   Research Questions
The following research questions were raised to guide the study:
a.   What are the information and communication technology skills required by technical college teachers for effective implementation of electrical installation and maintenance works curriculum for employability in Edo and Delta, Nigeria?
b.   What are the information and communication technology skills possessed by technical college teachers for effective implementation of electrical installation and maintenance works curriculum for employability in Edo and Delta, Nigeria?

4.   Hypotheses
The following hypotheses were formulated and tested at .05 level of significance:
a.   Technical college teachers' basic computer literacy skill does not significantly influence electrical installation and maintenance works employability in Edo and Delta States, Nigeria.
b.   Technical college teachers' internet and research skill do not significantly influence electrical installation and maintenance works employability in Edo and Delta States, Nigeria.

5.   Method of Study
The study adopted the correlational research design for the study. The study was conducted in Edo and Delta States. The breakdown of the population is as follows: 36 electrical and electronic teachers in Edo State owned technical colleges and all the 66 electrical and electronic teachers in Delta State owned technical colleges Nigeria. Due to the manageable size of the population, there was no sampling. The entire population was used in the study. The instrument for data collection is a structured questionnaire. The questionnaire was derived from review of related literature was used for data collection in this study. A questionnaire titled "Influence of Teacher's ICT Skills on the Employability of Student's Specializations in Electrical Installations and Maintenance Works (ICTSESSEIM)" The instrument was divided into three sections "Section A, and B,". In section A, focused on the information and communication technology skills required by technical teachers and this section were rated on a four-point scale of Highly Required (HR) - 4, Required (R) - 3, Rarely Required (RR) - 2, and Not Required (NR) - 1. Section B of the instrument focused on the information and communication technology skills possessed by technical teachers and this section was rated on a four-point scale of Highly Possessed (HP) – 4, Possessed (P) – 3, Slightly Possessed (SP) – 2, Not Possessed (NP) - 1.

The instrument was subjected to face and content validation by three experts, two from the Department of Vocational and Technical Education Ambrose Alli University, Ekpoma and one in Measurement and Evaluation University of Benin, Benin City both in Edo State. The suggestions and corrections of the experts were used to produce the final version of the instrument used for this study. Cronbach Alpha was used to establish the internal consistency of the items in the instrument. The reliability index of .72 was obtained. The instrument was administered by the researcher and five other research assistants. 98 copies of the questionnaire were duly completed and returned after two weeks. This gave 98.5% return rate. The research questions were analyzed using mean and standard deviation, Research Question 1 and 2 were answered with mean $(\overline{X})$ and Standard Deviations while Hypotheses were tested using the Linear Regression Analysis (LRA).   Any item on ICT skills that had a mean score of 2.50 and above was regarded as required/possessed, whereas any item with a mean score below 2.50 was regarded as not required/not possessed. The decision of testing the hypotheses was based on comparing the critical values obtained from statistical tables with the values of the statistical tool used (t-test) at .05 level of significance. A null hypothesis is accepted when the critical value is greater than the calculated value of the statistics, otherwise the null hypothesis was rejected and the alternative accepted.

6.   Presentation of Results

6.1   Research Question 1: What are the information and communication technology skills required by technical college teachers for effective implementation of electrical installation and maintenance works curriculum for employability in Edo and Delta, Nigeria?

Table 1. Mean responses on the ICT Skills Required

S/N	Items	X̄	SD	Remark
1.	Basic computer literacy skill.	3.61	.49	Required
2.	Internet and research Skill.	3.40	.49	Required
3.	Digital teaching skill.	3.33	.47	Required
4.	Coding and programming skill.	2.94	.53	Required
5.	Data analysis and management skill.	2.90	.66	Required
6.	Troubleshooting and maintenance skill.	3.11	.54	Required

Mean scores is significant $\bar{X} \geq 2.50$)

Table 1. presents the analysis of the information and communication technology skills required by technical college teachers for effective implementation of the Electrical Installation and Maintenance Works curriculum for employability in Edo and Delta States, Nigeria. The criterion mean for acceptance was 2.50, and all items had mean scores above this benchmark, indicating general agreement among the respondents. The results show that the mean ratings on items 1, 2, 3, 4, 5 and 6 were marked required with mean ratings ranging from 2.90 to 3.61 and standard deviations ranging from .47 to .66. The mean ratings were all marked required because the mean points were above the benchmark of 2.50 set for the study. This indicates that basic computer literacy skill, internet and research skill, digital teaching skill, coding and programming skill, data analysis and management skill, and troubleshooting and maintenance skill are the information and communication technology skills required by technical college teachers for effective implementation of the Electrical Installation and Maintenance Works curriculum for employability in Edo and Delta States, Nigeria.

6.2   Research Question 2: What are the information and communication technology skills possessed by technical college teachers for effective implementation of electrical installation and maintenance works curriculum for employability in Edo and Delta, Nigeria?

Table 2. Mean Responses on the ICT Skills Possessed

S/N	Items	X̄	SD	Remark
7.	Basic computer literacy skill.	3.17	.63	Possessed
8.	Internet and research skill.	3.08	.74	Possessed
9.	Digital teaching skill.	2.83	.61	Possessed
10.	Coding and programming skill.	2.46	.63	Possessed
11.	Data analysis and management skill.	2.54	.65	Possessed
12.	Troubleshooting and maintenance skill.	2.56	.66	Possessed

Mean scores is significant $\bar{X} \geq 2.50$)

Table 2. presents the analysis of the information and communication technology skills possessed by technical college teachers for effective implementation of electrical installation and maintenance works curriculum for employability in Edo and Delta States, Nigeria. The results show that the mean ratings on items 7, 8, 9, 10, 11 and 12 were marked accepted with mean ratings ranging from 2.46 to 3.17 and standard deviations ranging from .61 to .74. The mean ratings were all marked agreed because the mean points were all above the benchmark of 2.50 set for the study. This indicates that basic computer literacy skill, internet and research skill, digital teaching skill, coding and programming

skill, data analysis and management skill, and troubleshooting and maintenance skill are the information and communication technology skills possessed by technical college teachers for effective implementation of the electrical installation and maintenance works curriculum for employability in Edo and Delta States, Nigeria.

7. Research Hypotheses

7.1 Hypotheses 1: Technical college teachers' basic computer literacy skill do not significantly determine electrical installation and maintenance works employability in Edo and Delta States, Nigeria.

Table 3. Regression analysis of Technical College Teachers' Basic Computer Literacy Skill and Electrical Installation and Maintenance Works Employability in Edo and Delta States, Nigeria

Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	Std. error	Beta		
1	(Constant)	23.369	1.830		12.770	.000
	Basic Computer Literacy Skills	.165	.110	.153	1.501	.137

Dependent variable: Electrical Installation and Maintenance Works Employability
NOTE: R^2 = .023, F=2.254 P<.05, DF, 94

Table 3. showed the regression analysis of technical college teachers' basic computer literacy skill and electrical installation and maintenance works employability in Edo and Delta States, Nigeria. The results showed that an R^2 value of .023, indicating that only 2.3% of the variation in employability is explained by computer literacy skills. The model was not statistically significant, $F(1.94) = 2.254$, $p = .137$ ($p > .05$). The unstandardized coefficient (B = .165, SE = .110) and standardized coefficient (β = .153) revealed a weak positive relationship between computer literacy and employability, but the t-value of 1.501 and significance level of .137 indicate that the relationship is not significant. Therefore, the null hypothesis stating that technical college teachers' basic computer literacy skills do not significantly determine employability in electrical installation and maintenance works is accepted.

7.2 Hypotheses 2: Technical college teachers' internet and research skill do not significantly influence electrical installation and maintenance works employability in Edo and Delta States, Nigeria.

Table 4. Regression analysis of Technical College Teachers' Internet and Research Skill and Electrical Installation and Maintenance Works Employability in Edo and Delta States, Nigeria.

Model		Unstandardized Coefficient		Standardized Coefficient	t	Sig.
		B	Std. error	Beta		
1	(Constant)	22.948	2.303		9.963	.000
	Internet and Research Skills	.191	.139	.140	1.374	.173

Dependent variable: Electrical Installation and Maintenance Works Employability
NOTE: R^2 = .020, F =1.888 P<.05, DF, 94

The results in Table 4. showed an R^2 value of .020, indicating that internet and research skills explain only 2.0% of the variance in employability. The overall model was not statistically significant, $F(1.94) = 1.888$, $p = .173$ ($p > .05$). The unstandardized coefficient (B = .191, SE = .139) and standardized coefficient (β = .140) revealed a weak positive relationship between teachers' internet and research skills and employability, but the t-value of 1.374 with a significance level of .173 shows that this relationship is not statistically significant. Consequently, the null hypothesis stating that technical college teachers' internet and research skills do not significantly determine employability in electrical installation and maintenance works is accepted.

8. Discussion of Findings

The study found that technical college teachers in Edo and Delta States require six key ICT skills basic computer literacy, internet and research skills, digital teaching, coding and programming, data analysis and management, and troubleshooting and maintenance to effectively implement the Electrical Installation and Maintenance Works curriculum and enhance professional employability. Proficiency in these skills allows teachers to provide safe, hands-on virtual experiences, improve pedagogy, and align training with industry standards. These findings align with Odede (2022), who reported that teachers in southeastern Nigeria needed improvement in word processing, internet usage, and presentation skills for employability outcomes. They also support Ezugu et al. (2023), who found that EIMW teachers in Kano State required proficiency in all 34 identified technical and pedagogical competencies for effective teaching.

The study's results for question two revealed that technical college teachers in Edo and Delta States possess key ICT skills basic computer literacy, internet and research, digital teaching, coding and programming, data analysis and management, and troubleshooting and maintenance necessary for effective implementation of the Electrical Installation and Maintenance Works curriculum and enhancing student employability. These skills are essential as modern electrical work increasingly relies on digital technologies for design, documentation, analysis, and troubleshooting. Proficiency in electrical design software, project management tools, and diagnostic equipment ensures instruction meets industrial standards, while Microsoft Office and online research skills support lesson planning, reporting, and professional development. Collectively, these competencies allow teachers to deliver practical, industry-relevant instruction that equips students with the digital literacy and technical adaptability required for the 21st century electrical engineering sector.

The finding aligns with Ayatullah (2023), who reported that teachers' ICT skills directly improved students' competence in domestic and industrial electrical tasks, including machine winding, and with Ogbuanya (2020), who found that ICT-based training enhanced instructional delivery and practical skills. However, it contrasts with Wawo et al. (2021), Odika and Tom (2022), and Yusof et al. (2023), which highlighted inadequate teacher competence, limited infrastructure, and poor virtual classroom skills as barriers to effective ICT integration in Rivers, Kano, and Yobe States.

9. Conclusion and Recommendations

The study concluded that technical college teachers in Edo and Delta States generally possess a broad range of ICT skills basic computer literacy, internet and research, digital teaching, coding and programming, data analysis and management, and troubleshooting and maintenance necessary for effective implementation of the EIMW curriculum. These competencies align with curriculum requirements and provide a foundation for technology-driven, employability-focused training. However, not all ICT skills equally translate into improved employability outcomes for students.

Based on the findings, the following recommendations were made:

a. The management of technical colleges and curriculum developers should strengthen training programs that enhance teachers' proficiency in advanced ICT tools such as simulation software, IoT-based systems, and multimedia instructional platforms. This will ensure that teachers can effectively integrate modern technologies into classroom and workshop instruction to improve students' employability.

b. The government and educational agencies should provide periodic professional development opportunities for teachers to upgrade their competence in specialized software, project management tools, and PLC operations. Such training will align teachers' skills with current industry demands and enhance the practical relevance of technical education.

c. Training initiatives should focus on higher-order digital competencies that directly relate to industrial applications. Emphasis should be placed on applied technical software and automation systems rather than general computer use.

d. The NBTE should ensure teachers' internet and research skills are developed through targeted digital research workshops emphasizing problem-solving, innovation, and the application of online resources in real-world electrical installation scenarios. This approach will make research skills more practical and relevant to employability.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this research.

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