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# The Knowledge, Skills and Competencies Development Approach of Nigerian Engineers within the COVID-19 Pandemic and Restrictions.

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**Abstract -** *Development of knowledge, skills and competencies (KSC) is vital for engineering to succeed and thrive. This paper investigates and documents the main approach engineers practicing in Nigeria adopted to develop their KSC especially within the restrictions triggered by the global outbreak of covid-19. Notably, this pandemic required physical distancing protocols championed and enforced by governments in Nigeria and abroad.*

*This study examined this KSC development approach through a review of literature and data from the Nigerian engineers. Workshop of Engineering Faculty, University of Nigeria provided additional study group. 155 completed and usable survey questionnaires and 30 semi-structured interviews with engineering professionals registered by the Council for the Regulation of Engineering in Nigeria who are practicing in both private and public sectors. Participants were drawn from the membership database of the Nigeria Society of Engineers. To develop their KSC within restrictions and lockdowns, Nigerian engineers adopted eLearning and mentoring. Evidences also revealed that Covid-19 restrictions accelerated eLearning culture among engineers in Nigeria. furthermore, this study presented a mentoring guideline for engineering, as well as established that eLearning and mentoring is affordable, satisfactory to both individual and project outcome. eLearning and mentoring are global practice, but then locally contextualized and therefore sustainable.*

***Key Words***: Skills Development, Competencies Development, Nigeria, Engineering, Covid-19, eLearning, Mentoring, Knowledge Management.

## 1.INTRODUCTION

According to Ameh and Odusami (2014), the development of skills and competencies is a function of knowledge input gained in professional discipline and training. It requires the acquisition of a variety of knowledge and skill sets. The engineering and construction industry, since the 60s and 70s, has largely been dominated by foreign companies, generating revenue and creating jobs for government and Nigerians although with lots of imported resources and skills at the management and technical level as against using mostly indigenous resources and skills (Nigeria Bureau of Statistic 2017).

However, in Nigeria as revealed by Odumeru and Ilesanmi (2015), an organization's commitment and employee competencies are significantly determined by employee participation in KSC development. On account of Saini et al. (2018)'s findings; managing engineering and construction project is a complex process that aims to achieve multiple objectives. Developing KSC is crucial to successfully manage these complexities in engineering and construction processes (Khattak and Mustafa 2019). It requires the acquisition of a variety of knowledge and skill sets that often cut across areas of expertise. interestingly, the two conditions to become an engineering professional in Nigeria is registration and continuous professional development (COREN Act. 2018). Earlier study by Onyia (2019) reported traditional training as the KSC development approach of Nigeria engineers. This study identified and explored the approach Nigerian engineers adopt in compliance with the continuous professional development aspect of the engineering law, especially at this time of global outbreak of Covid-19 pandemic.

Across the world, Covid-19 pandemic has forced physical and social distancing protocols, travel and gathering restrictions (WHO, 2021; NCDC, 2021) amongst others. To update their KSC amid the Covid-19 restrictions, this study discovered that Nigerian engineers combine eLearning and mentoring. A globally accepted approach that is locally contextualized. Additionally, it was revealed that Covid-19 restrictions accelerated eLearning culture among engineers in Nigeria.

## 2. COVID-19 PANDEMIC (CORONAVIRUS)

Covid-19 is a novel member of coronaviruses (CoV) that are zoonotic and causes cold and other respiratory symptoms, kidney failure and death.
Even in presence of vaccination, the standard recommendations to reduce the spread include physical or social distancing, regular washing of hands and wearing of mask, as well as fourteen days isolations for exposed persons (WHO, 2021). Although majority of countries across the world have started lifting restrictions in movement of people, the pandemic has reduced the rate of close contact human relationship (Han et al, 2021). According Nigeria Centre for Disease Control (NCDC, 2021) Nigeria has tested 2,589,130 samples, confirmed 181,962 cases, with 12,917 active cases, discharged 166,826 recovered cases, and most regrettably, 2,219 deaths. The Federal Government of Nigeria had eased

these restrictions but following the new deadly delta variants of the virus, the government on Tuesday, May 12, 2021 had declared phase four restrictions. Reimposing curfew and restrictions against movements and mass gathering across the country (Channels TV 2021).

These impacted all worship centers, educational facilities, recreational venues, gyms, and indoor sports facilities (NCDC, 2021). The Presidential Taskforce on Covid-19 (PTF) is the Nigerian government steering committee on Covid-19 had reviewed the nationwide curfew from 10:00pm – 4:00am daily in a bite to discourage nightlife which the government considers as a super spreader. According to US Embassy and Consulate in Nigeria (2021), gathering of more than fifty people are prohibited by Nigerian government, while religious events are currently limited to 50% of normal capacity. The government is constantly advocating for remote hosting of academic and learning events like conferences and workshops were necessary. It encourages the wearing of nose mask in all public events.

International travel is not left out, Nigeria government has placed a travel ban on all non-resident travelers into Nigeria from countries like Brazil, Turkey and India. While Nigerian citizens and residents are strongly advised against travelling to these countries and where mandatory 14 days quarantine is enforced upon arrival (Channels TV 2021). most countries have imposed Covid-19 travel restrictions on Nigeria. Some like the United States of America requires at most a three-day verifiable Covid-19 test result before a traveler is allowed to travel (US Embassy in Nigeria 2021).

With the emergence of delta plus variant termed the "variant of concern" in some quarters and currently being studied across the world (Sanjay 2021), we wait to see how the PTF of Nigerian government will respond. Sanjay (2021) reported that this the delta plus variant displays worrying traits and has been designated as variant under investigation. Researches are yet to determine if it is more transmissive, causes more severe disease or more resistant to antibodies.

## 3. KNOWLEDGE, SKILLS AND COMPETENCIES (KSC) DEVELOPMENT

Huselid et al. (1997)'s three cardinal of human capital needed for successful delivery of any project are knowledge, skills and competencies. According to Esmee-Sinead and Markham (2019), knowledge is an understanding of technical know-how, while skill is an acquired or learned ability to practice or perform an assigned task.

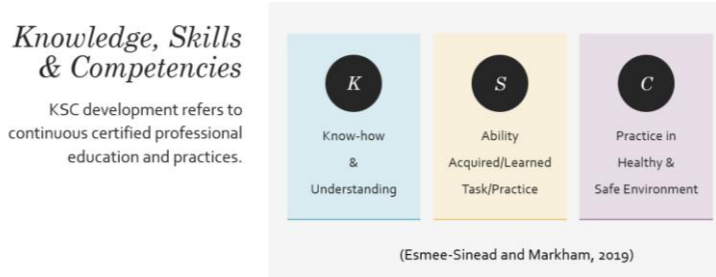


**Figure -1:** Knowledge Skills and Competencies

Huselid et al. (1997) alleged that skill is one of the three cardinals of the human capital needed for successful delivery of any construction project; others are knowledge and competence. Most times, these three arms of the human capital resources are inter-used, misused or misunderstood (Beneitone and Bartolomé, 2014). Over a decade ago, Bailey (2005) stressed the often-interchangeable use of skills, competencies, attributes and knowledge. He indicted the higher education, where actual meanings are taken for granted concerning this conceptual confusion.

Nevertheless, to offer meaning to skill, Price (2011) defines it as an acquired ability to execute a task that has pre-determined results, mostly with budgeted resources and time. For clarity, the author explained that skill means the ability to carry out a planned task and achieve planned successful outcome. Expantiating, it is stated as a learned ability to practice in a way. Price (2011) concertedly, asserts that skills are developed by learning. Bailey (2005) calls skills a sense of methods acquired through learning or practice. From all the existing literary definitions of skills, one phrase is most common "acquired by learning". This is what differentiates skill from talent, making skill development an educational process. Bergersen et al. (2015) observe that skills are a factor that directly affect the performance of an individual.

Ameh and Odusami (2014) demonstrated the approaches and requirements for developing KSC for an engineer in Nigeria. They referred to Project Management Institute (2008), which stated that the project competence development framework drew three dimensions of competence, which are: knowledge, skill and behaviour. And Crawford (2005) had similarly stated that for workers to be referred to as competent, they must possess the "right" combination of knowledge (which is what they know about their specialization), performance (which is, what they can do and accomplish while applying their knowledge) and then competence (which is, how the individual behaves when executing the project or activity; their core personality traits and attitudes towards safety, environment during practice).

To be professional is to make informed decisions, engineers must be able to have a grip on the technical aspects of the project. Engineers must be technically good and have the capacity to articulate and make good technical judgements as members of project leadership (McWhirter and Shealy, 2020). Engineers must be able to integrate and analyze, and they must understand the rigorous nature of training professional technologists, which stresses analysis and sometimes could impair their ability to integrate (Ameh and Odusami, 2014). However, KSC development in the context of this study refers to continuous certified professional education and practices of the Nigerian engineers. Previous studies have identified both formal and informal communication as an important skill that influences the process of KSC development (Szilárd et al. 2018; Khan et al. 2017).

Unlike skills which guarantee inputs, competence is defined by outcomes rather than inputs (Young and Conboy, 2013). Competence is the behaviour demonstrated by an individual

that enables them do their jobs effectively while skills apply particularly to those professional components required by a job (Woodruffe, 1993). In this light, the outcome of an engineer's performance or what an engineer can deliver makes them competent, which is different from skills, which refer to how an engineer did it or learnt to do it. By focusing on outcome instead of input, the approach to construction skills or competence is 'not tied to any model of training or education, both formal and informal' (Pye et al. 2011). Assessment and skill acquisition can take place in the workplace, training centers in addition to formal settings like colleges. This focus on 'output' instead of 'input', and applying defined 'standards' of competence as a basis for assessing 'performance' and delivering within the construction workplace, means KSC will continue to improve in construction workplaces (Pye et al. 2011). Results of study conducted by Detsimas et al. (2016) suggested that employees of the engineering and construction industry are generally very conscious of the importance of onsite and workplace training in developing their career. And they immensely appreciate learning as being a critical factor for the successful development of their KSC to effectively perform their roles and responsibilities, to sustain their KSC and retain employability (Onyia, 2019).

## 4. THE IMPORTANCE OF COMMUNICATION IN KSC DEVELOPMENT OF NIGERIAN ENGINEERS

Outside the formal and organized communication pattern, engineering and construction organizations widely adopt informal communication approach. Wilson and Ibietan (2013) reveals that the informal system offers the necessary communication outside the established formal channels of authority. In Nigerian engineering, Onyia (2019) stated that informal communication is helpful and important to maintaining organizational linkages, to fill in the gaps, omissions and more explanation of the formal system. This type of communication is ordinarily limited to oral face-to-face or through telephone, but with the availability of mobile internet and social media platforms, a significant part of it has moved online. As obtainable in most engineering organizations in Nigeria, both private and public, a lot of informal communication occur as rumors, gossips and can today be done using social media platforms like Facebook, WhatsApp, flowing along ethnic cliques and other sectional interests and associations (Okuonghae, 2018). It has a speed advantage over formal communication (Killian and McManus, 2015).

Informal communication in many organisations offers an opportunity for staffs to evaluate the leadership, a privilege withheld by the formal communication channel. Wilson and Ibietan's (2013) finding stressed that socialization is an important aspect of communication, especially, the informal channel of communication in any organisation. It is used as one of the tools to achieve the organizational goals (Leidner et al. 2018). Socialization and orientation are the processes of ensuring the introduction and induction of the personnel to the policies of the organisation, and is the first step in training and development of KSC (Patterson et al. 2017). Patterson et al. (2017) established that through socialization and induction, which usher in the platform for informal communication, employees also learn the culture and tradition of the workplace, its policies, their responsibilities, expected behaviour and team relations. Informal communication in Nigeria makes personnel more open and expressive. This facilitates the learning process, as there is better cooperation and understanding of instructions, mission statements, objectives and goals of the organisation. It makes it easier for employees to internalize the values of the organisation (Greenhow and Lewin, 2016).

## 5. METHODOLOGY

The strategies of questionnaire survey, semi-structured interview and study groups have been adopted for this study. As posited by Saunders et al. (2012), the use of two or more independent sources of data collection methods within one study to help ensure that the data are 'telling you what you think they are telling you', is known as triangulation. The survey and semi-structured methods adopted for the collection of data in this study were approved by the Ethical Committee of London South Bank University, after ensuring that all ethical issues raised were addressed. The committee ensured that the ethical codes of the University were strictly adhered to. Even though questionnaires and interviews are potentially intrusive, the questions for this research are not personal or sensitive questions, nonetheless, participants were advised to only respond to whatever they wish to. The questions have been structured to focus on the professional acts and experiences of the participants and not on their personal lives.

For the survey and interviews, the 155 participants of this study are registered with the Council for Regulation of Engineering in Nigeria but were drawn from the membership database of the Nigerian Society of Engineers. Participants are from both private and public sector, and represents different level of engineering management as shown in table 1.

**Table -1:** Stratification of database

| QUESTIONAIRE | INTERVIEW | PERCENT | LEVEL OF MANAGEMENT |
|---|---|---|---|
| 75 | 15 | 48.4% | Site Managers- Supervisors - Line Manager |
| 50 | 10 | 32.3% | Project Managers - Middle Managers |
| 30 | 5 | 19.3% | Project Executives - Senior Manager |

**Table -2:** Background information of research participants

| Which best describes your current job position | | | | |
|---|---|---|---|---|
| | | Frequency | Percent (%) | Cumulative Percent |
| VALID | Project Executive/Director | 9 | 5.8 | 5.8 |
| | Project Manager/Engineer | 55 | 35.5 | 41.3 |
| | Site Manager/Engineer | 26 | 16.8 | 58.1 |
| | Supervisor/Foreman | 40 | 25.8 | 83.9 |
| | Others | 25 | 16.1 | 100.0 |
| TOTAL | | 155 | 100.0 | |

| How long have you been involved in managing construction project? | | | | |
|---|---|---|---|---|
| | | Frequency | Percent (%) | Cumulative |
| VALID | Less than 1 year | 7 | 4.6 | 4.6 |
| | 1-5 years | 67 | 44.4 | 49.0 |
| | 6-10 years | 49 | 32.5 | 81.5 |
| | 11-15 years | 9 | 6.0 | 87.4 |
| | 16-20 years | 8 | 5.3 | 92.7 |
| | More than 20 years | 11 | 7.3 | 100.0 |
| | Total | 151 | 100.0 | |
| MISSING | | 4 | | |
| TOTAL | | 155 | | |

| Sex Gender of Participants | | | | |
|---|---|---|---|---|
| | | Frequency | Percent (%) | Cumulative Percent |
| VALID | Male | 152 | 99.3 | 99.3 |
| | Female | 1 | .7 | 100.0 |
| | Total | 153 | 100.0 | |
| MISSING | | 2 | | |
| TOTAL | | 155 | | |

Tables 2 reveal the background information of the participants that produced secondary data for this study through 155 surveys and 30 semi-structured interviews. Data analysis software SPSS and NVivo deployed for survey and interview as presented and analyzed in relevant sections of this paper for better appreciation and understanding.

In addition, the study group is the 2021 teachers/ supervisors' workshop of the Faculty of Engineering, University of Nigeria who are also registered and certified by both the Council for Regulation of Engineering in Nigeria and Nigerian Society of Engineers. The discussants are 44 participants forming 4 different discussion groups. Best practice for effective mentor-mentee relationship was the group discussion topic (see Table-3).

## 6. TRADITIONAL KSC DEVELOPMENT APPROACH IN NIGERIAN ENGINEERING.

This study examined different ways of developing KSC in engineering. First, some of these skills are being included in the curriculum of engineering in Nigerian universities (COREN, 2018). Secondly, professional and regulatory bodies like Council for Regulation of Engineering in Nigeria and the Nigerian Society of Engineers includes some of these courses in their mandatory continuous professional studies and examinations. Through these professional organizations, engineers acquire KSC in seminars, conferences and technical workshops organized by these organizations.

As stated by Armeh and Odusami (2014), KSC development is directed towards future needs of an organisation, it is concerned more with career growth. Which means that KSC development mainly focuses on organization's ambitious goals and building the required manpower to achieve them. It reinforces engineers and properly equip them to appropriately respond to the ever-changing engineering and construction industry. The link is the acquisition of knowledge, understanding of the KSC and attitudes which is derive from the organizational manpower policy objectives, and dependents on synergy between the organization and educational, professional and research/development centers.

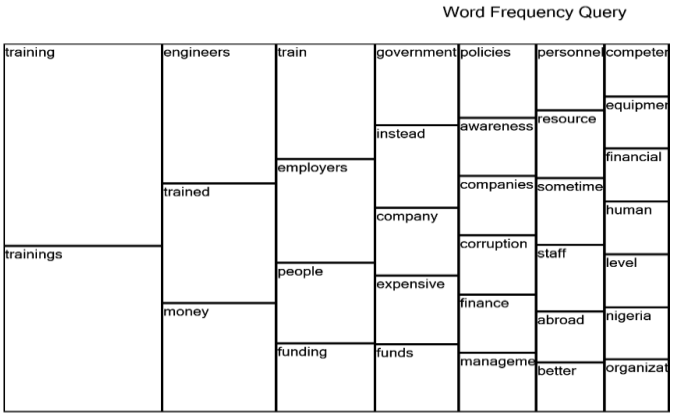


**Figure-2:** Training is the KSC Development Approach in 2016

From the NVivo tree map labeled figure 2, the big and repeated cubes indicate that all thirty (30) of the research respondents mentioned the word 'training' when asked about KSC development and improvement approaches practiced in Nigeria. Other words that were mentioned include engineers, skills, funding, money and employers' but training was dominant. The views as outlined in Figure 2 are that of the interviewees discussing traditional training as the main development approach of Nigerian engineers in 2016. However, it could also be observed from Figure 2 that training in the Nigerian engineering and construction industry are widely unstructured and unmonitored. This supports Detsimas et al. (2016) revelation that that there is an absence of a formal and harmonious mechanism for developing KSC in the Nigerian engineering and construction industry. This implies that there is no established training programme for Nigerian engineers. The respondents have different conditions, schedule and method of training and none is monitored by the regulators of the industry. This impedes organisations, project and HR manager's ability to identify, plan and organize KSC training programmes for construction and engineering managers. Further studies should aim to develop training guidelines which could identify the KSC gaps and outline training programmes.

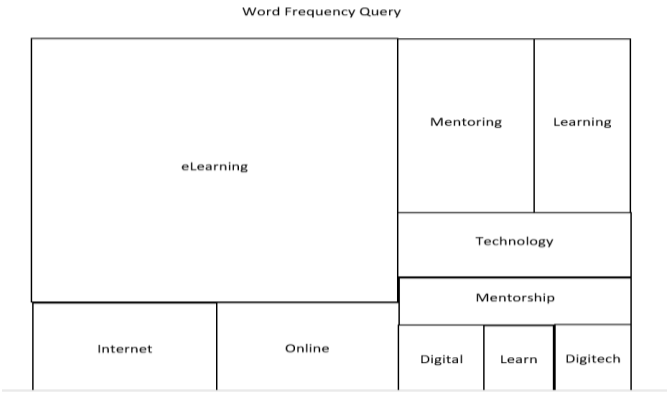


**Figure -3:** eLearning and mentoring is the KSC Development Approach in 2021

Figure 3 shows that eLearning, internet, online and mentoring were mentioned by Nigerian engineers when asked the their KSC development approach in 2021. This was also achieved through tree map analysis on NVivo software. The Covid-19 pandemic and restrictions is the main and critical change factor between 2016 and 2021. During the 30 semi-interviews, participants were unanimous in stating that the Covid-19 restrictions on gathering of people has drastically accelerated the cultural acceptance of eLearning and all form of digital transaction within the engineering and construction sector. This evidence supports Guermazi (2020) report; that eLearning was among the five main reasons for network congestion during Covid-19 in developing countries. Boutheina Guermazi is the World Bank Director of Digital Development. With the drastic change occasioned by Covid-19, it became imperative to check for outcome of the current eLearning and mentoring approach to KSC development (see Chart 1-4).

## 7. PRESENTATION AND ANALYSIS OF eLEARNING AND MENTORING IN NIGERIAN ENGINEERING

**Figure -4:** eLearning and Mentoring

eLearning which is an abbreviate for "electronic learning" is education completed utilizing electronic technologies to access teaching and learning resources as an alternative to traditional class room learning. It is interchangeably referred to as digital learning, distance learning, computerized learning, online and internet learning. one common trend in education systems around the world has been to respond to the pandemic with "emergency eLearning" protocols, marking the rapid transition of face-to-face classes to online learning systems (Michael, 2020).

Whereas mentoring is an intense interpersonal exchange (knowledge sharing) between an experienced colleague like the senior engineer and a less experienced engineer, in which the senior engineer provides direction, coaching, support and feedback regarding career plans and personal development (Arif et al. 2015). In a study of two Nigerian states Delta and Edo, Ojeaga and Okolocha (2021) discussed mentoring as a natural learning process where a relationship leads to a more experienced or knowledgeable individual known as mentor acts as a role model, counselor, teacher and guidance of a less experienced or knowledgeable individual called mentee for the purpose of sharing ideas, knowledge, skills and competencies, and offering support and direction for continuous personal and professional development. The main purpose of mentoring is professional development and performance for the mentee through personal and professional growth (Ojeaga and Okolocha, 2021; Arif et al. 2015). The personal relationship between mentors & mentees facilitates KSC development (Onyia, 2019), improve commitment and job performance (Ojeaga and Okolocha, 2021).

During a recent workshop with teachers/supervisors of the Faculty of Engineering, University of Nigeria on 18th May, 2021. Board members in discussion groups with the topic: Best Practices for Effective Mentor-Mentee Relationship. concluded and recommended the following guidelines for engineering;

**Table -3:** Mentoring Guidelines for Engineering

| | | |
|---|---|---|
| **A.** | **characteristics of an effective mentor-mentee relationship** | **Responsibility** |
| 1. | Provide master-craft guidance | Mentor |
| 2. | Demonstrate absolute loyalty | Mentee |
| 3. | Understand critical mentee's needs | Mentor |
| 4. | Exercise patience | Mentor |
| 5. | Communication | Mentor-Mentee |
| 6. | Accessibility to mentee | Mentor |
| 7. | Clear and detailed description of instructions | Mentor |
| 8. | Exhibit the right and intrusive attitude | Mentee |
| 9. | Experience and knowledge sharing | Mentor |
| **B.** | **Factors Influencing Successful and Failed Mentoring.** | |
| 1. | Funding when mentoring is project based | |
| 2. | Agreement on timeliness and deliverables | |
| 3. | Clear objectives and feasible goals | |
| 4. | Infrastructure and facility: lack of learning resources like internet, libraries etc | |
| 5. | Regulatory awareness | |
| 6. | Work Environment. | |
| **C.** | **Benefits of a Mentor-Mentee Relationship** | |
| 1. | Recommendations/ Lasting good relationship between mentor and mentee | |
| 2. | Facilitate Project Delivery | |
| 3. | Social care and general welfare | |
| **D.** | **Consequences of a failed Mentor-Mentee Relationship** | |
| 1. | Failed or incomplete project | |
| 2. | Difficulty in retirement of funds | |
| 3. | Inability to source for future project funds | |
| 4. | Attracts disciplinary actions | |
| 5. | Attracts negative reputations | |
| **E.** | **Recommendations** | |
| 1. | Annual mentor-mentee relationship workshop | |
| 2. | Communication is very important. The mentor and mentee must agree on mode of communication. One means of communication is usually not effective. | |

Table 3 presented the mentoring guidelines from group discussions of the board members of the Faculty of Engineering of University of Nigeria. The guidelines offered the characteristics, factors, benefits, consequences as well as challenges to mentoring in Nigerian engineering. Similarly, lack of sponsorship, poor internet infrastructure, aloofness are barriers against eLearning approach in Nigeria (Onyia, 2019). The disadvantage to traditional mentoring in Nigeria is its highly selective and elitist nature (Ojeaga and Okolocha, 2021). Nonetheless, eLearning and mentoring on the other hand meets most of the Covid-19 protocols like meetings between two-twenty individuals and digital engagements been acceptable to WHO (2021) and NCDC (2021) through different degrees of the Covid-19 restrictions and compliance protocols.

Although the aim of this study is to identify the current KSC development approach which is eLearning and mentoring, other objective of this study is to examine the effectiveness of this KSC development approach currently in practice in the Nigerian engineering and construction industry. To achieve this objective, research participants were asked to rate the effectiveness of eLearning and mentoring as their current KSC development approach, with the use of a likert scale; with 1, as very effective and 4, not effective. The result of the survey is presented in the Chart 1 to 4.

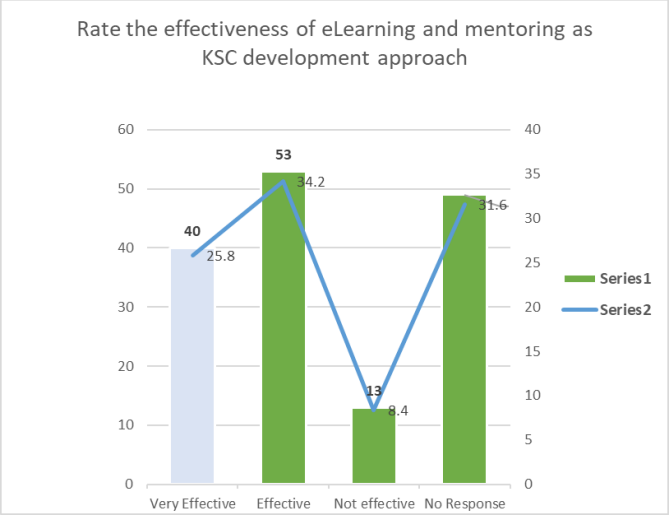


**Chart -1:** The Effectiveness of eLearning and Mentoring in the NECI

In Chart-1, 25.8% of the respondents believes that the current KSC development and improvement approach is very effective, while 34.2% of the respondents believe it is effective. Although 31.6% did not response to this survey question, and 8.4% are of the view that the approach is not effective, 60% of the respondents views this approach as either effective or very effective. This implies that eLearning and mentoring are the current and most effective approach for the development of engineering KSC in the Nigerian engineering and construction industry. The interesting aspect of this result is its implications for HR managers, organisations and the industry at large, which is that most engineering professionals and survey respondents endorsed eLearning and mentoring as an effective approach to engineering KSC development in the industry. Hence, these approaches can be adopted by all stakeholders for planning of KSC development programmes for engineers managing and supervising projects across Nigeria. Another important validation of these KSC development approaches is the question: How satisfactory is the impact of this approach on the project as well as on the participant. Engineers were asked a four likert scale question; Rate the level of satisfaction with the impact of eLearning & mentoring on project outcomes? This was to rate the level of their satisfaction with the impact of eLearning and mentoring on the project outcomes, the result is presented in Chart-2.

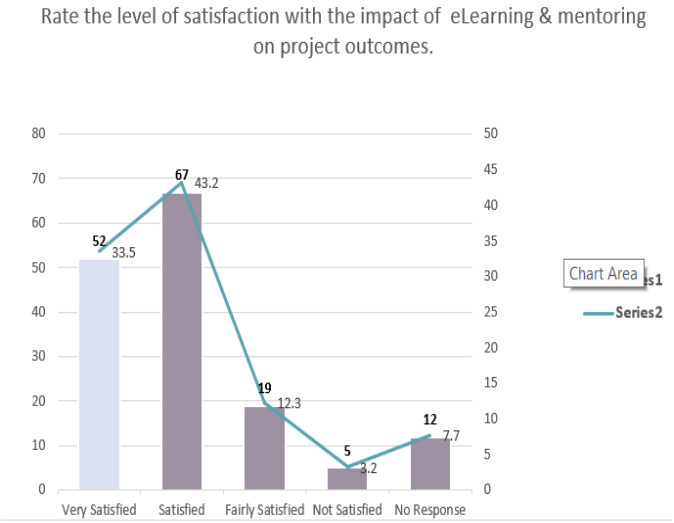


**Chart -2:** The impact of eLearning and mentoring on Project outcomes in Nigeria

It will be observed from Chart-2 that 33.5% of respondents were very satisfied with the impact of eLearning and mentoring as a KSC development approach on project outcomes in Nigeria, while 43.2% of respondents were satisfied, this result indicates that a total of 76.7% respondents believe that eLearning and mentoring approach to KSC development has a positive impact and outcome on their projects. The inference from this is that for the Nigerian engineering and construction industry, eLearning and mentoring as KSC development approach has good impact on project outcomes in Nigeria. The interview participants recounted how it guarantees positive project outcomes. To further understand the impact of this approach on Nigerian engineers, the survey respondents were asked to rate their satisfaction with eLearning and mentoring as KSC development approach in the context of their professional development and career; Rate the level of personal satisfaction with the quality of eLearning and mentoring received within the last six months.

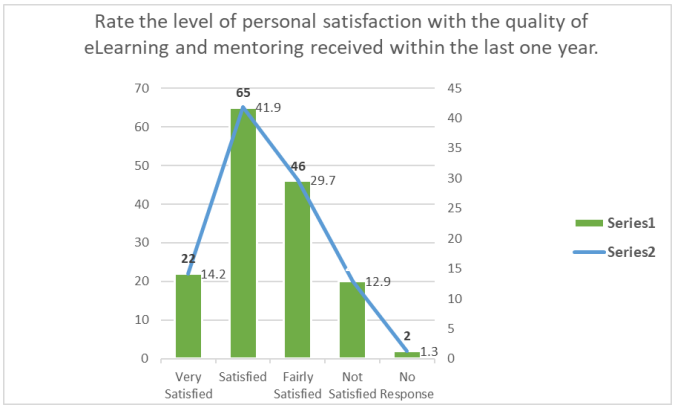


**Chart -3:** Training in the last one year has been Satisfactory

14.2% and 41.9% of respondents said they are very satisfied or satisfied with the quality and amount of training received in the last five years. The result, as shown in Chart-3, stated that over 56.1% of respondents put together are satisfied with the amount and quality of training they received within the last one year of Covid-19 outbreak. The 29.7% and 13.9% of participants are either fairly satisfied or not satisfied respectively. These are significate figures to be ignored, more needs to be done to turn this percentage of fairly and not satisfied to satisfied. Although, during the interviews, participants revealed that this percentage are mainly dissatisfied with the aloofness and discrimination associated with eLearning in the Nigerian engineering and construction industry not the effectiveness or impact of this approach as was demonstrated in Chart-1 and Chart-2(see appendix). Nonetheless, this study proves that eLearning and mentoring are satisfactorily effectiveness approach to KSC development in the Nigerian engineering and construction industry. We further verified the global acceptability of this approach.

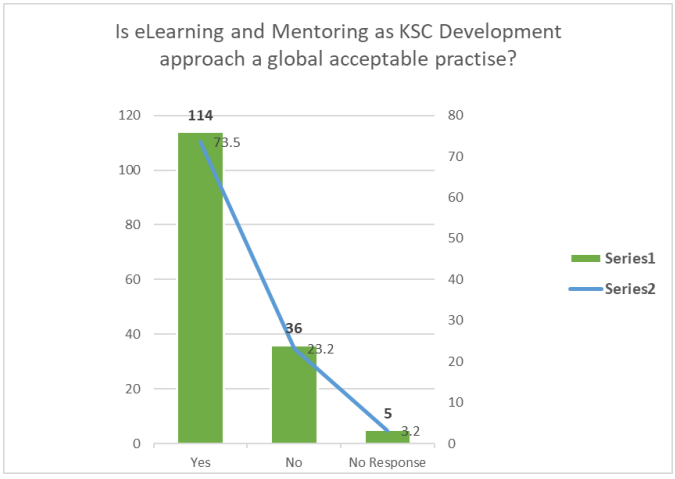


**Chart -4:** eLearning and mentoring is a Global Practice

Chart-4 indicates that 73.5% of respondents perceive eLearning and mentoring as a global practice while 23.2% said the practice is a local practice. Going by the percentage of yes, according to majority of Nigerian engineering professionals who participated in this study labelled this approach a global practice. This implies that the practice is not strange to the international industry. However, from opinions of the interviewees, it can be deduced that while eLearning and mentoring are global practices, the context of their application remains indigenous rather than global. This might be the mindset of the 23.2% of the survey respondents who view eLearning and mentoring as a local practice.

## 8. CONCLUSIONS

The Nigerian engineering regulation and laws mandate all engineering practitioners in the country to identify with a professional body of their category for continuous professional development of engineering KSC. Engineers in Nigeria accepted eLearning and mentoring as the continuous professional development approach in 2020, following the global outbreak of Covid-19 pandemic and its overwhelming restrictions on movement and gathering. Pre Covid-19, while

mentoring has remained a natural human practice, eLearning has been received with aloofness. Also presented are the characteristics, factors, benefits, consequences as well as challenges to mentoring for engineering by the Faculty of Engineering, University of Nigeria. What may be determined in the future is whether mentoring was reemphasized as a result of this aloofness to eLearning or purely a knowledge sharing culture for a contextualized understanding of KSC. Nonetheless, this mixed learning approach was born out of the Covid-19 restrictions and lockdowns. It is affordable, effective, satisfactory both at individual and project outcomes, an indigenous strategy and therefore attractive and sustainable. In all, it enabled engineers sustain one of the two conditions required by Nigerian law to remain a professional from the convenience of their remote locations.

As an established and effective outcome-based KSC development approach, engineering organizations in Nigeria should encourage both the industry and academia to promote and embrace this development approach for all practitioners. This transition will require increase in the quality services on the part of the network providers to ensure a quality eLearning and mentoring experience. As well as a continuous positive advocacy on the part of the Nigerian Society of Engineers and an open endorsement on the part of the Council for the Regulation of Engineering in Nigeria. These efforts will galvanize public enlightenment for eLearning and mentoring in engineering practice and may eradicate the aloofness culture attached to eLearning in Nigeria. Aloofness to eLearning is one of the main barriers to eLearning and mentoring in Nigeria, others are lack of sponsorship and poor internet infrastructure. Addressing these will ensure a sustainable transition to eLearning and mentoring as KSC development culture amongst engineering professionals in Nigeria. This approach will sustainably develop, share and retain engineering knowledge, skills and competencies in Nigeria.

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## REFERENCES

[1] Ameh, O. and Odusami, K. 2014. Nigerian Construction Professional's Education and Deficiencies in the Area of Project Management, Journal of Construction in Developing Countries; Pinang Vol.19(1), pp.1-14.

[2] Arif, M., Mohammed, A. and Gupta, A. 2015. "Understanding knowledge sharing in the Jordanian construction industry", Construction Innovation, vol.15(3), pp. 333-354.

[3] Bailey, N. 2005. The great skills debate: Defining and delivering the skills required for community regeneration in England. Planning Practice & Research, vol.20(3), pp.341-352. doi:10.1080/02697450600568688

[4] Beneitone, P., and Bartolomé, E. 2014. Global generic competences with local ownership: a comparative study from the perspective of graduates in four world regions. Tuning Journal for Higher Education, vol.1(2), pp.303-334.

[5] Channels Television. 2021. FG Reintroduces COVID-19 Restrictions, Shuts Bars, Recreational Centres, Limits Public Gatherings. May 10, 2021. https://www.channelstv.com/2021/05/10/breaking-fg-announces-phase-iv-of-covid-19-lockdown-to-take-effect-from-tuesday/

[6] COREN (Engineers Registration" ETC.) ACT, (2018). https://nse.org.ng/downloads/summary/3-general/104-corena-ammendement-act

[7] Crawford, L. 2005. Senior management perceptions of project management. International Journal of Project Management, Vol. 23, pp. 7–16.

[8] Detsimas, N., Coffey, V., Sadiqi, Z., and Li, M. (2016). Workplace training and generic and technical skill development in the Australian construction industry. Journal of Management Development, vol.35(4), pp.486-504.

[9] Esmée-Sinéad, H. and Markham, S. 2019. Constructing better health and wellbeing? Understanding structural constraints on promoting health and wellbeing in the UK construction industry. International Journal of Workplace Health Management, vol.3, pp.146.

[10] Greenhow, C., and Lewin, C. 2016. Social media and education: Reconceptualizing the boundaries of formal and informal learning. Learning, media and technology, vol.41(1), pp.6-30

[11] Guermazi, B. 2020. Digital Transformation in the time of Covid-19: The case of MENA. Arab Voices. https://blogs.worldbank.org/arabvoices/digital-transformation-time-covid-19-case-mena

[12] Han, Y., Yang, L., Jia, K., Li, J., Feng, S., Chen, W., Zhao, W. and Pereira, P., 2021. Spatial distribution characteristics of the COVID-19 pandemic in Beijing and its relationship with environmental factors. Science of The Total Environment, 761, p.144257.

[13] Huselid, M. A., Jackson, S. E., and Schuler, R. S. 1997. Technical and strategic human resources management effectiveness as determinants of firm performance. Academy of Management journal, 40(1), 171-188.

[14] Khan, A., Khan, S., Zia-Ul-Islam, S. and Khan, M., 2017. Communication Skills of a Teacher and Its Role in the Development of the Students' Academic Success. Journal of Education and Practice, 8(1), pp.18-21.

[15] Khattak, M.S. and Mustafa, U., 2019. Management competencies, complexities and performance in engineering infrastructure projects of Pakistan. Engineering, Construction and Architectural Management.

[16] Killian, G., and McManus, K. 2015. A marketing communications approach for the digital era: Managerial guidelines for social media integration. Business Horizons, 58(5), 539-549.

[17] Leidner, D.E., Gonzalez, E. and Koch, H., 2018. An affordance perspective of enterprise social media and organizational socialization. The Journal of Strategic Information Systems, 27(2), pp.117-138.

[18] Han, E., Tan, M.M.J., Turk, E., Sridhar, D., Leung, G.M., Shibuya, K., Asgari, N., Oh, J., García-Basteiro, A.L., Hanefeld, J. and Cook, A.R., 2020. Lessons learnt from easing COVID-19 restrictions: an analysis of countries and regions in Asia Pacific and Europe. The Lancet.

[19] McWhirter, N. and Shealy, T., 2020. Case-based flipped classroom approach to teach sustainable infrastructure and decision-making. International Journal of Construction Education and Research, 16(1), pp.3-23.

[20] Micheal, P.A, 2020. COVID-19 and emergency eLearning: Consequences of the securitization of higher education for post-pandemic pedagogy.

[21] Nigerian Bureau of Statistics 2018. Key Statistics for Nigerian Gross Domestic Product Report (Expenditure and Income Approach) Arrears of 2018 http://www.nigerianstat.gov.ng/

[22] Nigerian Centre for Disease Control 2021. COVID-19 Nigeria Confirmed Cases by State. https://covid19.ncdc.gov.ng/

[23] Odumeru, J. A., and Ilesanmi, O. A. 2015. The Effects of Human Resources Development on Financial Performance of Organisations. Asian Business Review, vol.2(1), pp.19-23.

[24] Ojeaga, I.J. and Okolocha, C.C., 2021. Assessment of Mentoring Practices Influencing Business Educators in Tertiary Institutions in Edo and Delta States. NAU JOURNAL OF TECHNOLOGY AND VOCATIONAL EDUCATION, 5(1), pp.1-14.

[25] Okuonghae, O. 2018. Librarians' Awareness of Social Media Usage for Informal Scientific Communication in University Libraries in South – South Nigeria. Library Philosophy & Practice.

[26] Onyia, U. 2019. Improving the supervisory and managerial skills and competencies required in construction management in Nigeria. LSBU

[27] Patterson, G. R., DeBaryshe, B. D., and Ramsey, E. 2017. A developmental perspective on antisocial behaviour. In Developmental and Life-course Criminological Theories pp. 29-35. Routledge.

[28] Price, B. 2011. Skill analysis part 1: defining and implementing a practice skill. Nursing Standard, vol.26(15-17), pp.50-55.

[29] Project Management Institute. 2008. A Guide to the Project Management Body of Knowledge, Project Management Institute, Inc., Newtown Square, PA http://usir.salford.ac.uk/9940/1/262_Pathirage_CP_KNOWLEDGE_MANAGEMENT_RESEARCH_WITHIN_THE_BUILT_ENVIRONMENT_IPRC_2005.pdf

[30] Pye K, Pye, M and Lagard, J 2011. A commentary on routes to competence in the construction sector, CIS http://www.ihsti.com/tempimg/503759-CIS888614800297554.pdf

[31] Saini, M., Arif, M. and Kulonda, D.J., 2018. Critical factors for transferring and sharing tacit knowledge within lean and agile construction processes. Construction Innovation.

[32] Sanjay, M 2021. How dangerous is the new Delta Plus variant? Here's what we know. National Geographic. July 2. 2021. https://www.nationalgeographic.com/science/article/how-dangerous-is-the-new-delta-plus-variant--heres-what-we-know

[33] Saunders, M.N.K; Lewis, P. and Thornhill, A. 2012. "Research Methods for Business Students", Financial Times/ Prentice Hall; 6 Edition; ISBN-13: 978-0273750758.

[34] Szilárd, S., Benedek, A. and Ionel-Cioca, L., 2018. Soft skills development needs and methods in micro-companies of ICT sector. Procedia-Social and Behavioural Sciences, 238, pp.94-103.

[35] Tobey-Clark, J. 2020. Distance Education, Clinical Engineering Handbook.

[36] US Embassy in Nigeria. 2021. "The Department of State has issued a Level 3 Travel Advisory for Nigeria". US Embassy and Consulate in Nigeria. https://ng.usembassy.gov/u-s-citizen-services/covid-19-information/

[37] Weinnhardt, M.J and Sitzmann, T. 2019. Revolutionizing Training & Education? Three Questions Regarding Massive Open Online Course (MOOCs), Human Resources Management Review.

[38] Wilson, G., and Ibietan, J. 2013. Communication and Manpower Development: Implication for Local Government Administration in Nigeria. Academic Journal of Interdisciplinary Studies, vol.2(2), pp.135.

[39] Woodruffe, C. 1993. What Is Meant by a Competency? The Leadership & Organization Development Journal, Vol.14, pp.29-36 file:///C:/Users/owner/Downloads/1691874.pdf

[40] World Health Organization 2021. About COVID-19, http://www.emro.who.int/health-topics/corona-virus/about-covid-19.html

[41] Young, M., and Conboy, K. 2013. Contemporary project portfolio management: Reflections on the development of an Australian Competency Standard for Project Portfolio Management. International Journal of Project Management, vol.31(8), pp.1089-1100.