

Political Capital as the Hallmark of Engineering Education in Africa

Kehdinga George Fomunyam

Abstract: *When a political actor or a government delivers on its promises, whether on provision of infrastructure or favourable policies, it automatically earns political capital as a reward and as a bargaining chip for future purposes. This study explores the intricacies of political capital and its impact on engineering education in Africa. It examines political leverage as a key indicator of a functioning education system and the effect of engineering education on politics in turn. Political capital enables political players use their connections to secure compliance especially in terms of advocating for and pushing forward policies that ensure growth in engineering education, which is an essential part of overhauling and restructuring the African economy. The study also suggests yet-to-be-explored routes that could further advance engineering education in Africa.*

Keywords: *Political Capital, Politics, Engineering, Education*

I. INTRODUCTION

In a time where governments in Africa are doing far from enough to restructure and improve the economy, a lot of the citizens are relying on having their representatives exploit accumulated goodwill for a trade-off of political favours aimed towards policy reforms and initiatives necessary to improve or transform numerous aspects of the economy, one of the most vital being the education sector. This goodwill or political capital as it is widely referred to, is used by political players to induce compliance by other people in positions of power. It is the form power takes in formal politics, it is also defined as the influence, trust or goodwill politicians build up with the public by pursuing popular policies (Market Business News, 2020). It is possessing the bargaining power or leverage to get things done. This goodwill which is a type of political currency, can then be exploited to push through unpopular legislation or policies as well without losing face with the interest groups. Elections can also be won if a candidate has good political capital and this capital can also be used on other politicians and to get the public to follow their lead. Representative capital stems from a politician's influence in setting policies, while reputational capital has to do with the level of credibility and reliability ascribed to a politician by society and fellow lawmakers, earned from consistently maintaining positions on ideological and policy views. As vague as the concept might appear it is very vital in the struggle to reform Africa's education sector, which is often and to a large extent at the mercy of the whims of politicians and government allocation and policies.

This study examines the extent of influence wielded by political capital in the education sector and answers the question; to what extent can such a tool be used to upgrade engineering education across African countries? The term political capital is built upon the idea of representation as a gap between citizens and politicians bridged by two-way judgement. It has the traits of an information good; difficult to estimate its cost, quick to depreciate and almost impossible to appropriate or monopolise. It encompasses the accumulation of resources and power nurtured through goodwill, trust, influence and relationships between individuals or parties and stakeholders. Representative capital refers to a player's influence in setting policies (French, 2011). This type of capital would be vital in pursuing engineering policies that would play a big part in transforming the African economy. Without addressing the numerous deficiencies in the African educational system, particularly tertiary education in the STEM areas, it would be virtually impossible for any sort of economic progress or transformation to occur because education is a major instrument of change and restructuring. Without the knowledge imparted by a functional education system the human capital charged with spearheading change would be severely handicapped as the fundamental and expert knowledge needed to carry out tasks, from the most elementary to complex innovative processes would be lacking. Key to infrastructural growth and industrial and manufacturing activities is engineering knowledge. Engineering can still be considered to be at an embryonic stage in the majority of African countries. This is so because a lot of the tools needed to impart knowledge in different subjects related to STEM are absent in the often deficient educational system in Africa (Barakabitze, 2019).

Much of Africa's challenge to successfully implement development programmes stems from defective educational foundations and capacity weaknesses at national, sub-regional and continental levels. Mastering and understanding the fundamental skills, concepts and intricacies of engineering is an integral part of solving many of Africa's technological and economic problems and joining the industrial growth trend evident in developed countries. Consequently, African countries are laying increasing emphasis on the importance of promoting engineering education as well as other STEM subjects across all levels of educational institutions. This study answers the question of how best political capital can be exploited and utilized to reform educational policies and push initiatives vital restructuring and promoting effective engineering education in African countries.

Revised Manuscript Received on September 25, 2020.

Dr. Kehdinga George Fomunyam, Mangosuthu University of Technology, Durban, South Africa. E-mail: kehdingageorge@gmail.com

Understanding the Challenges of Engineering Education in Africa

According to the African Development Bank, most African schools do not specialize in STEM subjects and less than 25% of African higher education students are in STEM fields, with the majority of students studying social sciences and humanities. Uwaifo (2009), posits that “a country is said to have a setback in engineering education when the products from (its) engineering institutions cannot produce capital goods such as tractors, lathe machine, electrical & electronics devices, drilling machines, cars, iron and steel, train and other earth moving equipment as well as being unable to provide the engineering skills and expertise to undertake the exploitation of her natural resources”. This is the case in many African countries as the quality of engineering education available fails to empower graduates with the necessary knowledge and skills needed to manufacture or innovate even the most basic of devices.

Extensive research by scholars across the continent has determined the situation of engineering education and training in Africa to be dire and Goolam (2014) attributes this state of affairs to; A shortage of engineers yet unemployment of engineering graduates in some African countries, limited funds to procure laboratory equipment and other facilities, obsolete curricula and old methods of teaching as well as poorly educated graduates who are sometimes unemployable and unable to compete with foreign trained colleagues, poorly qualified academic staff with limited industrial experience. (Lawless, 2005) ascribes the situation to; difficulty in recruiting and retaining staff because of poor employment conditions, weak university-industry partnership, limited opportunities for industrial experience for engineering students. The low capacity is attributable to a number of reasons including; limited public investment in engineering infrastructure projects, inadequate legislation to uphold engineering standards through requirements for professional registration, lack of regulatory laws to enforce foreign companies to effect knowledge transfer to local engineers and other issues, all resulting in brain drain of engineering talent to other sectors or other countries. Firmin Matoko, UNESCO assistant director general for education opines that; ‘We need to help Africa tap into scientific inventions and discoveries that are happening around the world, and step up investments in scientific research to enable Africans be producers of knowledge rather than consumers by embracing the advancement in technology and equipping the youth with relevant knowledge and skills the 21st century demands.’ While engineering has been introduced in the education system in most African countries the expansion and its adoption remains slow due to a lack of effective education policies, teacher capacity, and financial resources (Barakabitze, 2019). Engineering education directly impacts growth and development in various sectors of any economy. This applicable across African countries as well, with particular focus on experimentation and innovation. The need for engineering-based innovation is particularly relevant to Africa in its struggle to strengthen its economy and for innovation to occur, proper and outcome-based engineering education is necessary. A nation’s growth often hinges on how well its infrastructures function, which is a

direct index of efficiency of the human and material resources and invested capital. The maintenance and development of infrastructural innovations are entrusted to engineers, therefore a country lacking well educated engineers often encounters challenges in its growth agenda. Mukeredzi (2019) opines that Africa has a critical shortage of highly trained engineers and low enrolment in STEM programmes, far behind global averages. Specifically, the African Capacity Building Foundation has estimated the continent suffers from a shortage of over four million engineers. According to Kigali (2019), there are fewer than 2,000 colleges and universities on a continent with a billion people in 55 countries with less than 7% of Africans possessing college degrees. Economic and structural stagnation as well as increased rate of failure in engineering infrastructure in Africa necessitated the call for capacity development and identifying Africa’s engineering capacity needs as tools to promote innovations and engineering solutions that directly address Africa’s particular fundamental, foundational and structural challenges. Engineering and politics — should not be viewed as separate worlds as they are interconnected in some ways. Engineering is critical not just for creating technical solutions, but for informing public debate and shaping public policy.

II. LITERATURE REVIEW

Political capital is to a large extent made up of intangible assets politicians utilize to compel compliance from fellow persons in positions of power or influence. These include politicians, heads of industry and labour, the media, professionals, presidents and others. (Neustadt 1990: 30, 40, 150, et al). The strength of one’s political capital determines or influences outcomes in negotiations or situations of importance. In formal politics power takes the form of political capital. According to Bourdieu capital is divided into economic, social, symbolic and cultural capital and political capital falls under symbolic power. It is nurtured and built on credit and recognition and given to the wielder by those who submit to it (Bourdieu 1981: 14). The ideology is that a politician who is a public figure offers himself for the good of society and the considerations framing his life become quite different from those framing the lives of those he is answerable to- the represented. (cf. Schabert 1989: 219; Strauss 1959: 16–17; Thiele 2006: 10–11). It is said that the prospect of the absence of power is the source of concern for the politician not the power itself and this threat of withdrawn power is constant with the presence of the represented- the constituency. The gap between politician and those he represents is filled with reciprocal gestures of judgement on both sides. The products of these acts of judgement is political capital. It is this ideology that Ankersmit refers to when he posits that power stems from the decision of the people to permit the division of their body into represented and representative and neither side can claim it entirely since it is given to the representative and the represented cannot in themselves possess it entirely together.



In characterising political power we define it as a phenomenon, given to comparison rather than measurement (Barry 1991: 298; Young 1991: 132) and it is often in short supply, finite and chances of its renewal are uncertain. Political capital is also intangible, volatile and inherently unstable. Bourdieu (1981: 18) calls it 'supremely labile'. Schabert (1989: 24) says that 'power is an unsteady companion'. This stems from the fact that it is born of the judgement of the representative and the represented which is imperfect and prone to error sometimes as all judgement is. The amount of political capacity a politician has determines the extent to which he can change incentives structures (cf. Dowding 1991: 48). What determines a politician's political capacity? Two key factors that determine this are opinion (civic judgement) and policy (the sanctions and rewards at the disposal of the political actor) and political judgement by the political actor which is the reciprocal of the civic judgement delivered by the represented or society. It is the outcome of fusing policy and public opinion. The policy function consists of prerogatives such as funding, endorsing, voting, nominating and criticising and the opinion function which comprises; prestige, reputation and popularity or approval enjoyed by a politician. The agents compete in exercising judgement on the accumulation and investment of these resources. Whether he is a legislator or executive, a politician's efficacy is determined by the quantity or reserve of political capital he possesses. Politicians have very limited control over the management of political capital (Pierson 2000: 258). Politics is said to be contentious, unpredictable and competitive (Dunn 2000; Geuss 2008: esp. 15, 97 et al). There is a constant battle to maintain political capital as insufficient capital results in a loss of power. There is an eager monitoring of the competitor's capital by scrutinizing and analysing his every move and relationship, including his personal life. This gives an insight into current politics and a future pattern of occurrences (Neustadt 1990: 129; Schabert 2009: 13, 25-6, 56). This information enables them to enforce compliance in influencing their preferred policies. It is also used to pursue policy preferences and therefore to induce co-operation or compliance from other political actors. This inducement often takes the form of pressures, favours, threats and indulgences from one political player to another. Other forms of political capital include fund-raising appearances, endorsements, access, appointments for supporters or donors, committee or party assignments, legislative log-rolling, and other forms of cooperation or coercion limited by law and the political imaginativeness or visualization (Neustadt 1990: 30 et al).

The Influence of Politics on Engineering Education in Africa

Political forces play a dominant role in influencing and shaping the conduct of engineering education globally. Also, engineering education has been influenced by power, social and economic factors, which include the environment, water availability, education, housing, income distribution, employment, communication and transportation etc. These are dimensions whereby politics influences engineering education and it will be expatiated on in this study. Consequently, understanding the political dynamics of engineering education will be the focus of this study as it aims at discovering how political institutions have

influenced the practice of engineering education over the years and how engineering education also shapes and affects politics. Politics and political factors have a huge impact in shaping the flow of engineering education. Socio-economic factors like production, trade and commerce, employment, communication and housing also affect engineering education. These are some of the areas whereby politics impacts on engineering education. SEW-EURODRIVE and Bosch Rexroth are just some of the South African companies that joined a nationwide campaign utilizing 3D technology to print face shields and masks to protect health workers from Corona virus in support of the government effort to combat the pandemic. In 2014, Namibia became the first African nation to use electronic voting machines. Electronic voting machines (EVMs) used in the election were provided by Bharat Electronics Limited, an Indian state owned company. The decision to automate voting and import the technology as opposed to engineering it locally are examples of how politics affects engineering education in the sense that building the technology locally would present a learning opportunity for local engineers. The Nigerian government in recent years conducted a compulsory national bank verification exercise for all its citizens, issuing bank verification numbers to all account holders in the country. This exercise utilized thumb-printing machines and computers which were made by engineers and would be a learning experience for local engineers if they had been locally produced. Some years back there was also the automated voters registration exercise conducted with imported technology as well. Decisions like these are taken across Africa and are examples of how choosing to continually import technology negatively affects the ability of African engineers and technologists to innovate. Across Africa also, notable academicians are appointed by the government to head various boards, projects and parastatals for the growth of the economy, these are some ways politics influences education and vice versa. Ethiopia's recent drive to become a major engineering and industrialization centre is another example of how politics influences engineering education. It is working with an indigenous plan with an active industrial policy as its focal-point, which has influenced the practice of engineering education. The University of Zimbabwe Dean of Engineering was in 2019 appointed as the new Waternet Board Chairman. A McKinsey 2017 report revealed that South Africa is also seeking to automate 60% or one third of its processes by 2030. The Rwandan government is also seeking to be part of the fourth industrial revolution and is working hard to build skills needed to produce relevant technologies for Africa's innovators. Adopting this view has shaped the practice of engineering education in Rwanda (Ntirenganya, 2017). Recently, there was an abolition of the dichotomy between university and polytechnic graduates by a house of representative bill in Nigeria (Enekwechi, 2019). This will ensure better inclusion of polytechnic graduates, this is another example of political influence on education which affects engineering (Akinnaso, 2016).

Political Capital as the Hallmark of Engineering Education in Africa

President Buhari also recently signed the engineers ACT 2019 aimed at strengthening the Council for Regulation of Engineering in Nigeria (COREN) and holding engineering professionals accountable for building faults which lead to collapses. This regulatory act highlights the connection between politics and engineering education. A stalled 10 billion dollar port building project between China and Tanzania to be carried out by engineer is another example of how politics influences engineering education. Egypt, Ghana, Angola and other African countries have or have had similar policy changes, laws, enactments and business agreements affecting engineering education. China has at one point had political agreements with most African countries that influence engineering education. The conduct of engineering education is influenced by laws and regulation and this is vested in politics. All African countries have laws instituted which guides the practice of any discipline and these laws are also relevant for the practice of engineering education. Failure to adhere to the set laws and regulations such as safety regulations can badly deter the practice of engineering education (Odendaal, 2019). Evidently, the political scene in Africa has been significantly influenced by educational advances, dynamic attitudes and the impact of television and other media which is attributable to the advances made in engineering education. This sums up the interrelationship between politics and engineering education in Africa (Fomunyan, 2019).

The Role of Political Capital in Advancing Engineering Education in Africa

Successfully influencing education reform is a complex venture as there are several considerations and obstacles to weigh; government accountability or transparency is not assured, there may be little pressure on the government to pursue meaningful educational policies, the opportunity cost to the people and educational system of channelling resources towards engineering education as opposed to other areas of education, strategic plan for effective advocacy, the incentive for political actors to introduce reforms geared towards improving education quality may not be as politically beneficial as assumed. Overall the individuals, incentives, and institutions that would lead the national government to prioritize quality and equitable education may be absent. Ndalichako (2018) posits that for Africa to fully benefit and cope with technological transformation, universities must adopt research-based education to improve the quality and quantity of STEM education, systematically scale up support to STEM disciplines, maximise the use of digital technology, and create innovation hubs. How can political players and the government put their political capital to use to encourage and support high quality engineering education across Africa? In examining the role of political capital in engineering education and the role of effective engineering education in earning political capital, there are a few considerations; first and foremost, there are numerous aspects of the current education policy that require reformation, from adopting problem based learning approach, enforcing an itinerant curriculum, unifying admission requirements and enforcing a standard staff recruitment process. Higher academic standards for new teachers, more effective training, and performance

incentives must be put in place for high quality education to occur. Government must support education research and development, and the collection and spread of information about the scope and quality of the nation's education system, to inform policy and practice at the state and institutional levels and support the development and conditions to promote continuous improvement of the engineering education systems. Policies ensuring quality control and accreditation of engineering programmes should be highlighted. Political capital can be put to use in pushing for policy reforms that will ensure education is prioritized and receives a good chunk of government allocation needed to overhaul engineering education in various African countries, proper allocation is necessary to provide technological and infrastructural requirements. Research which is vital for growth should also be a key focus of policy reforms. Political negotiations need to focus on a major revamp of engineering education; from unifying admission requirements and staff job criteria to the curriculum which has to be updated to reflect current innovative needs and teaching methods relevant to the African economy. There is also the need for pedagogical training of engineering lecturers to equip them with the skills they need to help students learn using appropriate pedagogical methods. Engineering faculties and schools should take better advantage of the flexibility an outcome-based accreditation presents, as an opportunity to try out new models or introduce courses better suited to African engineering needs. Experimentation and innovativeness should be fully imbibed into the curriculum as opposed to maintaining strict guidelines less suitable for learning needs, while interdisciplinary learning should be engrained in the undergraduate level as well as graduate level. Higher institutions should create more rigorous standards for faculty appointments and staff qualification. The core of engineering should be taught from the first year, with the curriculum reflecting the basics of engineering - designing, performance prediction, testing and building. Case studies should also be utilized in undergraduate and graduate curricula. All these might take the form of proposed policies which could be proposed by the higher institutions through their representatives, and reviewed and supported by the government. The engineering faculty officials should encourage research as an important aspect of engineering activity that increases the connection to undergraduates, in terms of understanding their learning methods and preferred pedagogy. In addition to content delivery, faculties and schools of engineering must teach students effective learning methods and encourage lifelong learning by offering advanced degrees and programs while professional organizations should also ensure further lifelong learning and professional growth of engineering students and faculties. Policies advocating for capacity building and skills development should also be encouraged, while nurturing innovation by students and at industry level. Further proposed changes include; a change in attitude, philosophy, performance, leadership skills and a combination of both technical and non-technical components.

It will also go a long way in terms of advocating for an upgrade in infrastructural needs of existing institutions. It will also be useful in bridging the communication gap between the government and public higher institutions in terms of articulating and drawing government attention to their needs. More effective industrial training can also be emphasised on for engineering students as well as creating incentives for strong university-industry linkages whereby industries and companies liaise with educational institutions and take on mentoring roles where engineering students and graduates will be guided on relevant skills to acquire to resolve current technological challenges. With the right education policy reform and proper channelling of funds all focused on rethinking how higher institutions educate engineers, African engineers will be adequately trained to “address the complexities of the modern society’s issues by innovating systems and processes (Ed Crawley). Ruth Graham (2018) posits that “Many political leaders outside of the U.S. are investing heavily in engineering education as it is viewed as a hotbed for entrepreneurs focused on technology. It is believed that in the near future engineering education via entrepreneurship will be at the forefront of economic growth across Africa. A report by Ruth Graham identifies some key challenges facing engineering education, and in some cases higher education as a whole, including streamlining the objective of governments and higher education, delivering student-centered learning to large student cohorts, and setting up faculty appointment and promotion systems that better reward high-quality teaching. A government or body of political actors that successfully brings about educational reform in addition to earning a tremendous amount of political capital which will be useful for future elections, will also gain the allegiance of the people which in its own self is valuable political currency to be used as a bargaining chip and ultimately steer public opinion in favour of the government or players.

III. METHODOLOGY

This study utilized a qualitative data collection technique by reviewing individual interviews and observing occurrences in politics and the engineering sector. The study examined various published articles authored by industry experts in engineering education, government and political analysts. It therefore adopted a descriptive methodology to review 22 journals, articles and interviews in the cause of thoroughly scrutinizing the role of political capital in engineering education in Africa. Internet search terms used are; political capital OR politics OR engineering education OR engineering OR African government.

IV. FINDINGS

This study established that political capital to a large extent influences engineering education in Africa and cited some examples of situations where political decisions affected required engineering knowledge and expertise. There is also a relationship between political actors in government and execution of successful policy reforms. Where a player successfully advocates for an engineering education policy overhaul or implementation of processes and systems that improve the quality of education in African higher

institutions, such a player is rewarded with political capital and a vote of confidence from the society and institutions in form of favourable public opinion, which can be used as a bargaining chip at a future date to gain political favour or advantage. Without government support engineering education may be unable to advance. The study established that political capital if properly exploited, often enables a player to move to a higher and more powerful position.

V. CONCLUSION

Politics is a lot like engineering in that they both require proffering solutions, one to public policy issues and the other to technological and infrastructural challenges. The exertion of political capital is a critical part of transforming and upgrading engineering education in Africa through policy advocacy. Politics is a vital part of human relations and it is evident in all sectors. To a large extent the level of political capital higher institutions have access to determines the level of progress they will achieve in pursuing educational reforms. Concern about the poor education system in African countries has put quality at the centre of the education agenda in developing countries. Many elements of a good education system are lacking in most developing countries. The political quandary is reforms to raise standards presents minuscule gain for the current government. These educational policy reforms raises cost borne by the institution and its staff and the benefits for the institution and its students takes awhile to reflect in the system, far beyond the political players tenure (see Bruns, Macdonald and Schneider in World Development). Consequently, there is very little incentive on the governments part to pursue vigorous and change-inducing reforms in engineering education. The solution to this is for the institutions to pursue changes outlined in the recommendation section while also working out strategies that impart some form of benefit to the players as an incentive.

RECOMMENDATION

In order to build and sustain a mutually beneficial relationship between power players using their political capital to influence engineering education reforms and higher institutions that need these policies successfully passed, certain measures should be put in place; Task force or working committees comprising government officials, university staff, students, industry representatives and experts need to be established to establish clear areas of need, steps and policies that should be pushed for the effective transformation of engineering education across African institutions. Virtual forums should be held intermittently to bridge communication gaps between the parties as well. Institutions should also take advantage of emerging technology to react to and communicate quickly with political players, especially on issues impacting engineering education.

Political Capital as the Hallmark of Engineering Education in Africa

There needs to be a shift towards student-centered learning programs with a more society-centred curriculum tailored to the technological issues of 21st century Africa. Also uniform curriculums need to be in use across all engineering faculties in institutions, this will make policy adjustments or change seamless and easier. Monitoring committees should be set up to ensure compliance to new directives. Political capital is required in executing solutions to public policy problems.

CONTRIBUTION OF NEW KNOWLEDGE

A new crop of leaders capable of delivering student-centered curricula have to be trained. Higher institutions, especially engineering faculties need to establish a coherent and integrated curricula through the use of connected design projects. Universities should embrace blended learning, combining campus, online and real life personalized learning with experiential learning on campus and in work-based placements. There should be a focus on education model learning, specifically models structured around multidisciplinary work-based learning and an emphasis on student self-reflection.

REFERENCES

1. Akinsanya, O.A., Omotayo, K. F. (2013) Falling Standard of Engineering Education in Nigeria_ Causes and Suggestions
2. Barakabitze et al (2019) Transforming African Education Systems in Science, Technology, Engineering, and Mathematics (STEM) Using ICTs: Challenges and Opportunities. Retrieved from: <https://www.hindawi.com/journals/edri/2019/6946809/>
3. Baron, K. (2016) Finding a Balance for the Federal Education Policy. Retrieved from: <https://www.carnegiefoundation.org/blog/finding-a-balance-for-the-federal-role-in-education-policy/>
4. Bourdieu, Pierre. (1986). "The Forms of Capital." In The Handbook of Theory and Research for the Sociology of Education. ed. J.G. Richardson, New York: Greenwood Press, 241-258.
5. Bruns, B., Schneider, B. (2019). The politics of quality reforms and the challenges for SDGs in education. Retrieved from: <https://www.sciencedirect.com/science/article/pii/S0305750X19300336>
6. Bruns, B. (2019). What makes a Politician tackle Education? Retrieved from: <https://www.cgdev.org/blog/what-makes-politician-tackle-education>
7. Casey, K. (2020) Defining Political Capital: A Reconsideration of Bourdieu's Interconvertibility Theory. Retrieved from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.502.5941&rep=rep1&type=pdf>
8. <https://pdfs.semanticscholar.org/f041/e3dc28413f8a6667a90d330ad26f91bc5b4f.pdf>
9. Fomunyam, K. (2019). The Political Dimensions of Engineering Education in Africa. International Journal of Mechanical Engineering and Technology 10(10), 2019, pp. 196-205. Retrieved from: <http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=10&IType=10> or https://www.academia.edu/41438096/THE_POLITICAL_DIMENSIONS_OF_ENGINEERING_EDUCATION_IN_AFRICA
10. French, R. (2011) Political Capital. Retrieved from: <https://www.tandfonline.com/doi/pdf/10.1080/00344893.2011.581086?needAccess=true>
11. Gratton, G., Holden, R., Lee, B. (2020). Political Capital. Retrieved from: <https://gratton.org/papers/Political%20Capital.pdf>
12. LinkedIn. Political Factors Influencing Education (2020). Retrieved from: <https://www.google.com/url?q=https://www.slideshare.net/mobile/zikru/politic-and-education&sa=U&ved=2ahUKEwiv9b-g4J3qAhU6lcUKHScqA7EQFnoECACQAg&usq=AOvVaw1o1Bi-v8yc6eJX6Ki2eKFj>
13. Lamiell, P. (2012) How Should Politics Influence Education Policy? Retrieved from:
14. <https://www.tc.columbia.edu/articles/2012/february/how-should-politics-influence-education-policy/>
15. Market Business News (2020). Political capital. Retrieved from: <https://marketbusinessnews.com/financial-glossary/political-capital-definition-meaning/amp/>
16. MarkLines (2020). SEW-EURODRIVE (Pty) Ltd, Bosch Rexroth using 3D printing to produce face-masks in South Africa. Retrieved from: <https://www.marklines.com/en/news/238460>
17. Mohamedbhai, G. (2014) improving the Quality of Engineering Education in Sub-Saharan Africa. Retrieved from: http://www.gedcouncil.org/sites/default/files/content/GMohamedbhai_Report%20on%20Engg%20Education%20Version%202_0.pdf
18. Market Business News. What is Political Capital: meaning and definition. Retrieved from: <https://marketbusinessnews.com/financial-glossary/political-capital-definition-meaning/amp/>
19. MIT News (2018) Reimagining and rethinking engineering education. Retrieved from: <http://news.mit.edu/2018/reimagining-and-rethinking-engineering-education-0327>
20. Owen, D. (2020) The Past Decade and Future of Political Media: The Ascendance of Social Media. Retrieved from: <https://www.bbvaopenmind.com/en/articles/the-past-decade-and-future-of-political-media-the-ascendance-of-social-media/>
21. Oloyede, A., Ajimotokan H., Faruk N. (2017) Embracing the future of engineering education in Nigeria: teaching and learning challenges. Retrieved from: <http://www.nijotech.com/index.php/nijotech/article/view/1464/1167>
22. Shrestha, U., Williams, T., Al-Samarrai, S., Geldermalsen, A., Zaidi, A (2019) What is the relationship between politics, education reforms, and learning? Evidence from a new database and nine case studies. Retrieved from: <http://pubdocs.worldbank.org/en/856881567524290888/Reforms-to-improve-learning-30-Aug-TPW-FINAL.pdf>
23. Uwaifo, V.O. (2009) Technical education and its challenges in Nigeria in the 21st Century. Retrieved from: http://www.academicjournals.org/app/webroot/article/article1381821563_Uwaifo.pdf
24. Wikipedia (2018) Retrieved from: https://en.m.wikipedia.org/wiki/Electronic_voting_by_country