



Engineering Education and Individualism: The Quest for Individual Excellence

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ABSTRACT

Engineering has been a discipline that is different from others as a result of various reasons. First, it is old as human civilization, and it has always been over the years. Excellence has over the years been a word common to institutions of learning as it has been a major part of most institutions vision and mission statement. This is not only limited to the academic institution as people have demonstrated excellence across various fields of human endeavour. Excellence is a defining character that sets individuals apart from others and it can be gotten by fulfilling certain standards that confer a mark of exceptionality on people. One of the most notable authors on individualism opined that it is an aspect of culture that is related with traits like independence and taking care of oneself. Findings from the study revealed that individual excellence gives specificity to the concept of excellence as it focuses on the individual. Thus, it was important to analyse individual excellence in engineering education using individualism and in doing this, some defining element in individualism were conceptualized for achieving individual excellence in engineering education. The study therefore recommended that to ensure the relevance of the distinction and excellence individualism offer, it must be subject to empirical verification.

Key words: engineering education, individualism, individual excellence, excellence. Engineering, quest

1. INTRODUCTION

Engineering has been a discipline that is different from others as a result of various reasons. First, it is old as human civilization, and it has always been over the years. With the evolution of man, the need for survival and sustenance was borne and the early man had to explore the environment in search of food and other elements that are vital for his survival. In doing this, he devices simple ways of exploring the environment using simple tools which has over the years been built on to have the complex array of engineering

devices we have now which has made life better. This is line with the findings of Constable G et al (2003) who opined that the 20th century had in it amazing engineering achievements that resulted in longer and better lives for people globally. With elements of engineering seen in our daily lives and all around us, one can attest to the versatility of the discipline and with this knowing, it can be said that the discipline has been different from others hence a mark of excellence.

Excellence has over the years been a word common to institutions of learning as it has been a major part of most institutions vision and mission statement. This is not only limited to the academic institution as people have demonstrated excellence across various fields of human endeavour. Excellence is a defining character that sets individuals apart from others and it can be gotten by fulfilling certain standards that confer a mark of exceptionality on people. According to Ruben B.D (2007), excellence within the American higher education looks at elements critical to establishing and maintaining an outstanding institution, department, or programme. Merriam webster dictionary (2020) defines excellence as very good or eminently good. But much more than this, this research will focus on individual excellence. Taking reference from our social makeup, humans are social beings that relates and interact with each other in a social sphere. As a result of this relatedness and interaction, there is competition for many things amongst them and when one exhibits exceptional character, the person can be said to be excellent.

One of the most notable works on individualism is the one by Hofstede (1984). Hofstede (1984) opined that individualism is an aspect of culture that is related with traits like independence and taking care of oneself. In broad parlance, individualism focuses on personal freedom and achievement, and it can be better understood taking reference from the cultural perspective. Individual culture ascribes social status to individual achievements which ranges from discoveries, innovations, great work of art, humanitarian feats and other actions that distinguishes individuals. Consequently, this study will conceptualize individualism in engineering education as a panacea for individual excellence.

2. METHODOLOGY

Research methodology is a set of systematic technique used in research according to Chinelo Igwenagu (2016), for this study, a comprehensive literature search was conducted in the electronic databases. The search terms used included “engineering education” or “individualism” “individual excellence” “engineering”. A more general search was done on Google search engine to capture all the relevant publications in the field of engineering that were published over the years. The relevant literature selected from the databases were in form of journal articles, conference papers, white papers, working papers, books, thesis, and reports.

2.1 RESEARCH GAP

Excellence has been a common word in everyday interaction, and it is predominantly used within the higher education institutions as part of their vision and mission statement. It’s not only applicable to individuals, the use spans companies and organizations, government, team etc. Apart from standard measures of excellence like the grades as seen in the academia, ascertaining in real terms what excellence is along disciplinary lines might be difficult because the word is more of a construct. In this dimension, what excellence is in engineering education becomes difficult to ascertain. From a sociological perspective, the life of man revolves around relationships, and he exists in a territory, influencing and been influenced by the environment. Making the case for individualism along this line might be difficult as man’s life is predicated on interaction and engagement with others in a social system.

2.2 EXPLORING ENGINEERING EDUCATION IN AFRICA

Engineering has been reputed to be a creative process. To clearly understand engineering education in Africa, it is important to note what the discipline is. An engineer is involved in designing systems, processes and structures which leads to an improvement in the quality of life of humans. Engineering education according to Danko (2006) is the process by which students learn about the processes and knowledge that has ties with engineering. The dynamic of engineering in the 20th was characterized by various amazing achievements which made peoples life better. It is important to note that technology is the end product of engineering and some of these achievements include bridges, automobiles, skyscrapers, heating and cooling system, aircrafts, trains, electricity, telephone, computers etc. Using the apparatus of mathematics, science, engineers proffer solution to the various challenges of individuals. The process of imparting the skills and knowledge that culminates in the practice of engineering is engineering education.

The 21st century is also peculiar as an epoch with its attendant technologies which has made life better for all and

much more than this, the emergence of massive technologies in the fourth industrial revolution has given more credence to the 21st century. There are now various societal trends that is key for engineering education to take place. Replete among this are new changes along social, technical, economic, environmental, cultural sphere which requires new knowledge in proffering solution to the challenges. The knowledge of the past is not enough to deal with the challenges of the now and this is manifested in various consequences on humans. This is supported by the views of Grasso and Burkins (2010) who maintained that we now make attempts at educating 21-st century engineers with a 20th century curriculum taught and delivered in a 19th century institution. Graduates that pass out in the university cannot meet up with societal expectation as they are mostly taught theories without sound knowledge of the practical application of the things they were taught. This has also culminated in knowledge deficits which is manifested in knowledge produced not resulting in real societal change.

It is therefore important to have an overhaul in the teaching learning process in our higher institutions of learning so that knowledge delivered to students will culminate in real solution to societal challenges. We are in times of massive changes in the economy, environment, finances, technologies etc. which requires a responsive system of learning to deal with it. Engineering education as a creative discipline must deliver on its ideals in creating solution to various societal problems and this can be achieved by ensuring that the right knowledge is delivered to students, and they are given opportunity to practice what they are taught. The curriculum must therefore be tailored made to address the ills of these current time as well as ensure that those in charge of the curriculum understand the need to ensure an overhaul in the teaching learning process. This will confer on them the knowing and intentionality about making a change to the teaching learning process.

With engineering education being a dynamic discipline that must be responsive to changes and with time, the era we are now offer immense benefits and opportunities for the conduct and practice of engineering education in Africa. according to Klaus Schwab (2016) who is the director of the World Economic Forum, he opined that the fourth industrial revolution is a period in which there is a blurring of lines between the physical, digital, and biological sphere with the fusion of various technologies that has the capacity to influence business processes, systems and structures. Some of the technologies emerging from the fourth industrial revolution include internet of things (IoTs), big data, 3D and 5D printing, robotics and automation, cloud computing, virtual reality and augmented reality, artificial intelligence and machine learning, smart sensors, advanced simulation, nanotechnology, unmanned aerial vehicle, biotechnology, blockchain, cybersecurity, smart factories, internet of service (IoS), renewable energy and advanced energy storage,

quantum computing, internet of data (IoD), digital twin, predictive maintenance, material science, mobile devices etc. These technologies that are evolving with the fourth industrial revolution are vital for the conduct and practice of engineering education in Africa. With the need to encourage socio-economic development in the region, there must be integration of these technologies into production process which doesn't just happen like that. The old traditional system and method of teaching which produces graduates that cannot meet up with the demands of the labour market should be discarded and the focus should be on teaching subjects and skills that are relevant to the now which include science, technology, engineering, and mathematics subject (STEM). As the world is changing, there is a need for a new system of knowledge that will be able to deal with these changes and this can be achieved by having an overhaul in the entire educational process to have one that will be able to deliver the knowledge and skills needed now and in the future to students. This in the long run will culminate into having graduates that can meet the demands of the labour market, and then contribute to socio-economic development in Africa.

2.3 DISSECTING INDIVIDUALISM AS A CONCEPT

In broad terms, individualism is a concept that has in it personal freedom and achievement. In more general terms, it can be seen from a cultural dimension where recognition is given to giant strides made by people and this can be notable discoveries, innovations, great work of art or literary pieces, noble causes etc. As a result of certain desirable characteristics reposed in people by nature and through other learned capabilities, they bring such to the fore in their endeavour, influencing systems and standing out. This warrants the award of social status to such persons for their personal accomplishment.

One of the notable works on individualism is by Hofstede where he made the case for individualism-collectivism culture. Hofstede (1980,2001) opined that individualism is a society in which ties between people are loose and everyone looks after his/her immediate family needs. In his measure of individualism and collectivism, surveys of IBM employees in about 30 countries were used. Hofstede index and other measures of individualism from other studies were applicable in establishing and understanding cultural values. In Hofstede's analysis where the first factor about value of personal time, freedom, interest etc., the components load positively on valuing individual freedom, opportunity, achievement, progress, recognition and loads negatively on valuing harmony, cooperation, and union with superiors. This typifies that individualism might manifest in values that place huge attention on individual freedom and other desirable characteristics. It emphasizes the impetus to focus on oneself than being linked and loyal to a cohesive group. Individualism showcases how members of the society define

their self-image as an individual. Triandis (1993) revealed that for individualism, the prototypic relationship was linked to an individual and the marketplace. In that analysis, the individual pays and receives a good or service in exchange for the payment made. By such exchange, there is emotional distance, and each person recognizes and maintains their own unique identity. In individualism, the marketplace values competition and as a result of individual achievement and success, status is conferred on such person.

Furthermore, individualism was defined as a social mentality which stresses focus on the individual, valuing and recognizing individual achievement and promoting independent thoughts and action (Arasaratnam, 2011). The concept of self is major in individualism and the focus is majorly on the individual while valuing and rewarding individual achievement. This in turn promotes independent thoughts and action. Independent thoughts and actions are important in dealing with issues as seen in individualism. With independent thoughts and action, innovation is encouraged which ensures that production processes are made better using new methods.

Hofstede G (2011) listed some defining features of individualism which includes everyone is supposed to take care of him or herself and the immediate family only, "I" consciousness, right of privacy, speaking one's mind is allowed, others are seen as individuals, personal opinion is guaranteed: one person one vote, by transgressing norms there are feelings of guilt, languages in which the "I" word is indispensable, education has the sole aim of learning how to learn, task above relationships. Hofstede, Hofstede and Minkov (2010) opined that individualism is peculiar to societies where ties between people are loose. This implies that people often act to promote their own interest over the interest of others in individualistic culture.

It is now established from evidence above that individualism encourages a closed social surrounding in which individuals must care for themselves and their immediate families. It also emphasizes emotional independence and autonomy in people.

2.4 UNDERSTANDING INDIVIDUAL EXCELLENCE IN ENGINEERING EDUCATION

Individual excellence gives specificity to the concept of excellence as it focuses on the individual. The human life is one filled with activity and each day there is an aspiration for success. Humans are in constant pursuit of excellence, and this results in competition in defined and undefined terms. People at all times are on a quest to outshine others and when this is achieved, it confers an air of superiority on them called excellence. Excellence is the result of surpassing some standards of expectation. Effort might not be seen but it culminates in achievement and the as a result of the achievement, excellence is conferred on people.

Apart from the nobility excellence brings to people, there is a feeling of inner happiness and satisfaction people have when they surpass some standards of expectations. Thus, individual excellence is also referred to as personal excellence and in the words of Aziz Ullah (2019) it was defined as a lifelong process of developing mental and emotional skills to do better in all aspects of life and to achieve this, there is the need for personal growth and development. He went forward to opine that personal excellence is a step towards positive development beyond one's self and is a step-by-step process of improvement in all facets of life. This implies that individual excellence is not finite or absolute, it requires continuous concerted action to achieve it. This implies that individual excellence requires time, patience, and dedication to improvement over time. When this is done, the overall aspect of one's life is influenced.

The giant engineering masterpieces that we see each day and that has made life better didn't just come to be. They are years of constant studying and devotion to knowing, curiosity and provision of answers to questions. The idea and realization of the light bulb by Thomas Edison didn't just come to the fore and was achieved in a day, it took lots of processes and trials before he achieved it and the movable types by Guttenberg too was not just achieved. These amazing discoveries and others that have been made over the years have differentiated these men as a result of their achievement. They can be seen as excellent men.

It is important to note that organizations do not exist alone and the success of any organization, enterprise or discipline depends on the collective effort of the people in the organization. People make up systems and processes and in engineering education they are vital in realization of the goals of the discipline. Encouraging individual excellence is thus vital for success in a discipline or organization and this can be made possible by harnessing the different capabilities inherent and manifest in individuals to achieve excellence. This realization will even more be advanced when individuals are self-aware of the immense power lurking within them to improve systems, structures and processes and then decide to intentionally work towards being better which consequentially influences systems. To solve all human challenges, there is an engineering dimension to it.

A man keen on life-long self-improvement is an individual that is tending towards achieving individual excellence. Knowledge is infinite and there are no limits to what one can know. Much more than this, the daily questions life throws at people and the challenges of the now and future requires answers and solutions which engineering seeks to proffer. But engineering does not just exist and solve such challenges, people are involved in the discipline and they through their natural aptitudes and learned capabilities, work to proffer solution to the many challenges of this world. Engineering educators' function in different context and they play different roles in the industry and within the higher

institutions of learning. Not only as teachers, but they are also seen as important to the industry as a result of their knowledge gained over the years.

2.5 CONSTRUCTING INDIVIDUAL EXCELLENCE USING INDIVIDUALISM

Excellence has been a character that defines and separates people, and it is a common word within the higher education institutions. Thus, achieving individual excellence in engineering education will be understood using some elements of individualism. It has been noted above that individualism is keen on personal freedom and achievement and in that context the individual is king. These notions of individuality and its other dimension is vital in conferring individual excellence which will be discussed below.

Since individualist culture gives social status rewards to people who stand out, it may give a special, culturally motivated, incentive for innovation that is separate from the standard monetary incentive. This agrees with the opinion of Parrish and Linder-Vanberschot (2010) that students from highly individualist cultures would be comfortable speaking in a whole-class environment and be motivated by individual gain such as praise or good grades.

The human nature is characterized by one of social existence where there is in a territory interaction and engagement between people. By such interaction and engage, there is a competition along many dimensions though some may not be formal, and others can be formal. In a social system, people compete for space, resources, food etc. The daily pursuit of man is one characterized around competition. The search for food, money, better life is a competition among billions of people in this earth and those that can have those things might be guaranteed survival and sustenance. Along formal dimension, take for instance by various ground-breaking revelation or research made in engineering education to deal with a problem in the society, there is a recognition for such which can include awards, patents, recognition etc. This is in line with the views of Gorodnichenko and Roland (2010) who maintained that the need to stand out and the social status rewards that come with individual achievement can motivate people the more.

From individualism and in an individualist society, social status rewards are given to people who have distinguished themselves from others as a result of some certain defining characteristics they possess. When such social status is conferred on people who stood out, it fuels in people a special culturally motivated incentive for innovation which can culminate in individual excellence. There is a myriad of challenges that engineering education and engineering in general parlance seeks to solve and people daily are faced with such challenges which necessitates solution. Finding novel approaches to solving the challenge through innovation distinguishes people from others and culminate in individual excellence in engineering education. The world we are in now

is a large ground for various innovation because each day of life presents another challenge to solve and hence, engineering educators at all times must be at the top of their game and be good innovators to confer individual excellence on them. When by certain noble achievement in engineering education, social status and recognition is conferred on people, it confers on them more responsibility while giving them an opportunity to go all the way out through innovation in solving problems.

Individualism can make collective action more difficult because individuals pursue their own interest without internalizing collective interests. As noted here, collective actions become difficult in individualism and the notion of collective interest is jeopardized. In sociological parlance, collectivism is good, and it gives holistic approach to issues but dealing with a huge plethora of actors within a social system can result in different challenges for organizations and individuals. In collective societies or group, people come to the fore with their various concerns, ideas and viewpoints which makes processes, structures, and systems a bit slow. Hence, the need to encourage individualism which promotes self-interest without collective interest. An individual with a keen focus on himself and achieving his ideals, undeterred about collective interest and action will in the long run achieve individual excellence in his endeavour.

Furthermore, individualism confer individual excellence on people by ensuring higher level of productivity as a result of innovation. With social status for rewards and incentive for innovation individuals attain higher level of productivity which can help the quest for individual excellence. With novel approaches to solving issues, different options exist through innovation which encourages higher level of productivity and result in individual excellence. Also, people from individualist cultures also have a higher need for “self-enhancement”. The need for self-enhancement implies that one is motivated to see oneself in a more positive light. Indeed, as a result of self enhancement, much focus is on the individual to become better in all facets of life. when you seek self enhancement maybe by improving on your natural aptitude or learned capabilities, it helps ensure that one stands out amongst all and thus achieve individual excellence. Individualism is also associated with analytic thinking.

With the focus on the individual as the central figure in individualism, it encourages dissent and standing out and discourages group think or alignment with the views and opinions of others. A man in an individualistic society is not one given to conformity, he seeks to differ and stand out and this encourages individual thoughts and reasoning different from that of the group. When this is done, there is self-awareness and personal knowing which births curiosity to proffer answers to issues, avoid systemic failures, focuses on individual growth and development, and make the process of change easy to go by. When this is done, the quest for individual excellence is propelled.

More so, individualism encourages personal accomplishment. When as a result of certain attributes that an individual possesses achieves some feats, the feeling that comes from such personal achievement can also contribute to the quest for individual excellence in engineering education. Individualism also focuses on the relationship between self and groups of people. But there is a difference in such relationship with other groups. individuals with the independent concept of self-associate and develop ties with other people to meet their own needs rather than to attend to the needs of members of a particular group of people. When this is done, the individual leverages on the benefits he can gain from his association with the group and the people to his own advantage which can help his quest for individual excellence.

Conclusively, individualism allows for thorough introspection, self-consistency, strong consideration for self-esteem, primary control and actions that help people stand out which in the long run culminates in individual excellence. Freedom is vital in individualist culture, and this gives people the leeway for self-achievement this achieving individual excellence.

3 DISCUSSIONS

As a result of diversity and differences in humans, there are defining attributes which confer more essence on some than others and as a result of this, there is a mark of distinction and segregation amongst them along many dimensions. These differences in humans along many spheres has lent much credence to competition which is a common feature in social interaction though it might be well defined or not. With the marked differences in humans, it confers much ability on some to achieve certain feats and achievement which separates them from others. This is the import of excellence in social interaction.

Findings from the study revealed that engineering is as old as human civilisation, and it has been since humans existed. The need to survive and sustain living elements on earth has been aided by engineering which started from the use of crude implements to explore the environment for resources that will aid human survival. It is important to note that as humans explored and gained more mastery of the environment, they advanced in knowledge on how to better explore the environment which led to the creation of simple tools. This has over the years been made better as a result of globalization and new knowledge built. Thus, engineering and engineering education is important to individuals in the social system.

It was also found out that excellence is a common word notably amongst the higher education institution as it is a major part of their vision and mission statement. But the word and its use are not only limited to the academia, it spreads across all facets of human existence and endeavour and This is not only limited to the academic institution as people have

demonstrated excellence across various fields of human endeavour. Merriam webster dictionary (2020) defines excellence as very good or eminently good. This implies that it is a defining character that sets individuals apart from others and it can be gotten by fulfilling certain standards that confer a mark of exceptionality on people.

It was found out that individualism is one of the most notable works of Hofstede (1984). Hofstede (1984) revealed that individualism is an aspect of culture that is related with traits like independence and taking care of oneself. In broad parlance, individualism focuses on personal freedom and achievement, and it can be better understood taking reference from the cultural perspective. Thus, it was important to analyse individual excellence in engineering education using individualism and in doing this, some defining element in individualism were conceptualized for achieving individual excellence in engineering education.

Evidence revealed that individualist culture gives social status rewards to people who stand out, it may give a special, culturally motivated, incentive for innovation that is separate from the standard monetary incentive. This agrees with the opinion of Parrish and Linder-Vanberschot (2010) that students from highly individualist cultures would be comfortable speaking in a whole-class environment and be motivated by individual gain such as praise or good grades.

4. CONCLUSION AND RECOMMENDATION

The study has shed light on how individualism can confer individual excellence in engineering education using various elements of individualism. This has import on determining performance in individuals which can then influence the organization and the society at large. Thus, understanding individualism can be helpful in human resource management in engineering education so as to understand the import of ability and effort in engineering endeavour. It is also important to understand that as a result of promotion of independence and the concept of self, there will be a demand for protection of property rights, rule of law, and usurpation of institution

This study has contributed knowledge by offering a separatist view on one of the most notable dimensions in cross-cultural psychology which is the individualism-collectivism dimension. This distinction is important across various dimensions and its ability to culminate in excellence in engineering education has been considered. The separatist view is one with many facets which were analysed to understand excellence in engineering education. The study made the case for excellence in individualism from social status, rewards and many other elements considered in this study. This study has also shown theoretically a link between individualism and individual excellence in engineering education.

This research has shed light on individualism, and it has built on the knowledge of individualism by logical argument. The analysis in this research was confined to the individualism dimension in order to critically understand and address it as key in achieving individual excellence. The individualism dimension is important in understanding how cross-cultural differences influence all facets of human life. It was also conceptualized to understand how it could confer individual excellence in engineering education. This study therefore recommends that to ensure the relevance of the distinction and excellence individualism offer, it must be subject to empirical verification.

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