# Complementary Studies 441

# Task 1

Topic: How do we develop African oriented engineers?

Compiled by

Team 45

Consisting of team members:

|  |  |  |  |
| --- | --- | --- | --- |
| 19010516 |  | ALBERTUS | VAN RENSBURG |
| 18183247 |  | LAUREN | MITCHELL |
| 18317340 |  | ANELE | NGCOYA |
| 18308678 |  | STEFAN | LÖFFEL |
| 18173543 |  | FRANCO | DE BONDT |

# Plagiarism Declaration

I know that plagiarism is wrong.

Plagiarism is to use another's work (even if it is summarised, translated or rephrased) and pretend that it is one's own.

This assignment is my own work.

Each contribution to and quotation (e.g. "cut and paste") in this assignment from the work(s) of other people has been explicitly attributed, and has been cited and referenced. In addition to being explicitly attributed, all quotations are enclosed in inverted commas, and long quotations are additionally in indented paragraphs.

I have not allowed, and will not allow, anyone to use my work (in paper, graphics, electronic, verbal or any other format) with the intention of passing it off as his/her own work.

I know that a mark of zero may be awarded to assignments with plagiarism and also that no opportunity be given to submit an improved assignment.

I know that students involved in plagiarism will be reported to the Registrar and/or the Central Disciplinary Committee.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Student no | Date | Signature |
| F.H. de Bondt | 18173543 | 19/09/2017 |  |
| L. Mitchell | 18183247 | 19/09/2017 |  |
| A. van Rensburg | 19010516 | 19/09/2017 |  |
| A. Ngcoya | 18317340 | 19/09/2017 |  |
| S Löffel | 18308678 | 19/09/2017 |  |

# Introduction

The challenge of developing African oriented engineers is a highly complex problem for which there is no straightforward solution. For the purpose of this report, this topic will be narrowed down and refined in order to attempt to do justice to at least some aspects of it. However, before addressing the problem, it is necessary to define what being an African-oriented engineer means.

The team believes that being an African-oriented engineer means that an individual uses his/her engineering knowledge in order to help and improve the lives of people within society. Furthermore, it also surrounds the concept of being an active player in a diverse system that celebrates different cultures and backgrounds. African-oriented engineers recognize that the best solution is a solution that is inclusive and considerate. This can only be achieved by communication with all the stakeholders involved until a common understanding can be reached.

This report will further explore what it means to be an African oriented engineer and some of the challenges involved. The report will then focus on increasing the diversity of engineers graduating from tertiary institutions. It is the belief of the team that a more diverse workforce can come up with solutions that will suit the diverse cultures found in Africa. A combination of students from different backgrounds promotes the ability to develop and improve the necessary people skills required to work together and overcome challenges. Team 45 went to speak to Mr. Engelbrecht, the man in charge of student recruitment and retention at the Stellenbosch University’s engineering faculty, as well as to Element and NWE Consulting Engineers, two leading civil engineering firms about the above-mentioned topics.

# Literature review

This section refers to literature reviewed on how to develop African oriented engineers. This paper will briefly discuss what it means to be an African oriented engineer and some of the challenges that riddle the engineering profession in Africa. This will be followed by a discussion of the facilities and lived experiences that are required to ensure that African oriented engineers remain in Africa.

In essence, African oriented engineers do not only possess knowledge and skills that enable them to compete globally, but they are also prepared to live and work on the continent and contribute to the development and social transformation of the continent (du Toit & Roodt, 2009, p. vii). In order to efficiently and effectively fulfil their roles in society, African oriented engineers are cognisant of their respective country’s history and accommodate marginalised and rural communities in the type of solutions that they employ. The emphasis on rural and marginalised communities can be attributed to the fact that Africa is made up of predominantly rural and underdeveloped areas. According to Slum Almanac (2015/2016) “In Sub-Saharan Africa, 59% of the urban population lives in slums and by 2050, Africa’s urban dwellers are projected to have increased to 1.2 billion” (PSUP Team, 2016, p. 9).

Rural areas and the aforementioned slums are often exposed to poor education at under-resourced facilities and institutions, and this contributes to some of the challenges that the engineering profession is faced with. Substandard secondary institutions that plague Africa contribute to the influx of students into higher education institutions without the knowledge and skills that are necessary to complete higher education and training in engineering. The shortage in knowledge and skills results in a low throughput at higher education institutions (Daniels, 2007, p. 26).

While the accumulation of poor quality secondary education influences the caliber of engineers that Africa produces, it is not the only issue. Other challenges that the profession has to overcome are the lack of experiential training opportunities, failure to market engineering to individuals that are historically and/or currently marginalized, and lack of information on the different engineering fields as well as what each respective field entails (du Toit & Roodt, 2009, pp. 33-34).

Africa, and South Africa in particular, possess the potential to produce world class engineers. The immigration of African engineers to European and American countries is a testament to this. African companies often cannot offer better packages than the lucrative packages offered by overseas companies. Africa and its countries, therefore have to offer better benefits than high salaries. These could include a range of employment benefits, a stable political climate, as well as a safe working and home environment. (du Toit & Roodt, 2009, pp. 30-32). The challenge is then to ensure that Africa produces world class engineers that are willing and able to contribute the growth and development of the continent.

# Individual Interview with Mr. August Engelbrecht

**Lived experiences: How do we recruit and retain a greater variety of students?**

August Engelbrecht is currently in charge of student recruitment and retention at the engineering faculty of Stellenbosch University. What really stood out about Mr. Engelbrecht, aside from his obvious passion, was his willingness to enter into open and critical discussion. His opinion on issues relating to the retention of students has been shaped by direct feedback.

Mr Engelbrecht believes that feeling a sense of belonging is critical to students making it through their degree. There are students who do not feel like they belong to what is perceived as the dominant cultures at the university - Western and/or Afrikaans culture. According to some of the students that he spoke to, reasons for this include issues such as the language policy and the lack of black lecturers in the faculty. However, they also include much more subtle issues, such as the faculty cafeteria not catering for the diversity in terms of the cuisine of various cultures.

Addressing these issues would require some major changes in the faculty and would take time. However, creating an atmosphere where everyone feels they belong, has the potential to solve many of the retention and recruitment issues. This could arguably have the largest impact on achieving a more diverse community and it is a solution to a problem that some of the team members had not known existed.

On the topic of recruiting a more diverse group of students, Mr. Engelbrecht has a lot of ideas. He believes that it starts by instilling a passion for maths and science. He also thinks that interventions are required to ensure that teachers and parents are encouraging engineering as option for children that are so inclined. Mr Engelbrecht spoke of the “myths” surrounding engineering that he has discovered by talking to students and parents. High school students seem to have a range of opinions from “engineering is a dirty job” to “engineering is out of my reach”. Dispelling these myths could increase the number of applications from students that are suited for the profession, but did not think of engineering as an option.

**Interventions**

Mr Engelbrecht has a number of recruitment initiatives aimed at increasing the diversity of students applying to engineering at Stellenbosch University. One of these is the Engineering Role Models outreach program, which facilitates the meeting of black, coloured and Indian engineering role models and prospective students. It aims to show that engineering is open to anyone - no matter their background, culture or ethnic group. It is also a step towards making students feel like they can belong.

In October, he plans on starting a new initiative that invites a group of thirty black students to come to classes and stay in residences. The two day program plans to show students what studying engineering at Stellenbosch would really be like and aims to demonstrate that the university is accessible to everyone.

These are just two of the initiatives Mr Engelbrecht is busy with. There are many more, but both the team and Mr. Engelbrecht feel that social media is not being utilized enough. Social media has the potential to target a much bigger portion of prospective students. The team feels that updating on multiple social media platforms would help spread the word. The team also believes posting pictures of current students with their stories about their engineering studies, where they came from and where they want to go, could be inspirational to prospective students.

Mr. Engelbrecht also feels that the only way one can encourage giving back to communities after graduation is through contractual obligations signed in order to obtain funding for a tertiary education. He agrees with the team that compulsory community service after studying would be beneficial. Alternatively, he would like to see a compulsory number of hours in community service, with proof of value added to those communities, as a requirement for graduation.

As is evident from Mr Engelbrecht’s efforts, there is a lot that can be done to improve the diversity and feelings of inclusivity for prospective and current students. The team believes that by making this a priority, the development of African-oriented engineers can be achieved at a university level through the integration of different cultures and ideas. It is the hope of the team that this will naturally lead to greater unity and acceptance, as well as the people skills required to work with different people to develop solutions suitable for all.

# Organisational Interview

According Element and NWE Consulting Engineers, in order to develop African Oriented Engineers, many basic issues need to be addressed first. Education, in particular, was considered a major issue in integrating African individuals from previously disadvantaged backgrounds into the engineering industry. Furthermore, aspiring entrepreneurs need to be given the necessary guidance and support.

Element Consulting stated that engineering training focuses mostly on teaching students the technical engineering skills, thereby neglecting the business side of the engineering industry. Technical communication, in terms of technical report writing and the cultural language barrier was seen as major problem faced by young engineers. That is why there is a call from professional engineers for teaching students the correct engineering terminology from school level.

Ideas to improve the High School education system, especially aimed at improving the pass rate of pupils from previously disadvantaged backgrounds include creating a positive attitude towards important school subjects and teaching students the self-reliance that will be needed at tertiary education level.

One of the many African socio-economic issues is safety. Unsafe communities can make going to school difficult for students and can result in poor attendance. Few successful engineers coming out of these previously disadvantaged communities play their part in uplifting and inspiring the local community. The reality is that these individuals leave these communities as soon as they become successful, after which they focus on their individual aspirations. Creating safe communities where everyone feels they belong will be crucial in solving the aforementioned problems.

When asked if engineers should do compulsory work for the government in the public sector for two years with the aim of uplifting the rural public, NWE Consulting agreed, stating that in their experience young engineers are not always comfortable with the entire value chain of engineering projects. They believe it is a good idea for young engineers to form part of larger teams and they can learn from failures in public sector projects, usually due to insufficient operation and maintenance after construction.

Finding money to fund aspiring engineering students will always be a prevailing problem. For this reason, government initiatives like BBBEE and CETA were implemented to give companies some incentives to fund aspiring, young, previously disadvantaged engineering students.

For African tertiary institutions to be able to educate engineering students to better address the issues faced by rural communities sustainably, students will have to undergo more practical experience of the issues faced by rural, previously disadvantaged communities. Having students take a theoretical subject dealing with these issues will not have the same impact as seeing the problems face to face, and therefore theory should not be used as a substitute for practical experience. Engineers should be taught the necessary practical communication skills to interact with individuals from different backgrounds.

Engineering is not only about the provision of infrastructure. The solutions to the issues faced by rural communities require a social contract between the government, communities, engineers, donors, etc. Engineering should be about creating sustainable infrastructure. The development of a “social” business plan should thus form part of each design. Teaching students how to draw up such a plan will already go a long way.

# Conclusion

While there is no prescribed solution for developing African oriented engineers, the team was able to make a few deductions on how to develop African oriented engineers. At the forefront of these solutions is an improved secondary education system. Equally important is inspiring feelings of devotion towards Africa in engineers as well as ensuring that students feel welcome and included within engineering faculties. Another measure that can be taken to develop African oriented engineers is changing the perception of engineering as a blue collar occupation with no benefits. Integrating an entrepreneurial and business aspect to the engineering profession is also essential in developing African oriented engineers. Along with the entrepreneurial aspect is a community interaction aspect that would go a long way in gearing African engineers towards solving African challenges.

# Bibliography

Daniels, R. C. (2007). Skills Shortage in South Africa. Cape Town.

du Toit, R., & Roodt, J. (2009). Engineers in a Developing Country.

PSUP Team. (2016). Slum Almanac 2015/2016. UNON Publishing.