

# The Gap Between Matric Pass Requirements and Entrance to Engineering Education.

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## Abstract

The existing disparity between Department of Higher Education and Training (DHET) and Department Basic of Education (DBE) cannot be neglected. The purpose of the study was to investigate the requirements for passing matric in secondary schools and enrolling to engineering bachelor's degree in higher education. A sample of 400 learners/students was used to provide their perception on the requirements for passing matric and requirements for enrolling to a bachelor's degree. The data was gathered through questionnaires and interviews. The study provides research information on the entities (High school, college, and University) and it therefore quantified the extent to which the gap exists. From the survey, Majority of learners are aware of different certificates awarded after meeting the requirements for passing matric. However, these learners are not aware that entrance requirements to bachelor's degree in different universities are not the same. Learners are also not aware that a bachelor pass in matric does not guarantee them an entrance into a degree course. Many students from rural areas want to pursue engineering education but they don't have enough information about different degrees requirements and duration. The study indicates there is a need for information transfer between universities and secondary school. There should be coherence between DHET and DBE policy in order not to mislead learners.

## Keywords

Matric, Engineering education, University enrolment requirement.

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## 1. Introduction

Umalusi is the Council for Quality Assurance in General and Further Education and Training, Umalusi (2012), and is an independent body that is tasked with the supervision and accreditation of Grade 12 examinations. Umalusi Certificate also known as Grade 12 is an essential certificate for students or learners who want to pursue any post high school qualification, and more so in engineering which is the focus of this paper. Most Jobs opportunities in South Africa are advertised to applicants who hold Grade 12 or matric certificate. This requirement makes a grade 12 certificate to be very valuable and important in South Africa. The grade 12 certificate is divided into three levels that learners can be awarded in completion of matric. The matric certificate will show the achieved grades in the different subjects the student will have sat for. The three levels that grade 12 learners can obtain are; “higher certificate pass, diploma pass, and bachelor’s degree pass”, Umalusi (2012). These certificate endorsements are from Umalusi but they do not match the actual pass grades required by tertiary institutions to study engineering.

It is very important that high school educators and learners have understanding of matric pass requirement and different entrance requirements into different engineering education in higher institutions of learning. Grade 12 learners need to be aware of the minimum entrance requirements in order to be admitted into engineering education. This understanding will motivate learners to work hard so that they can pass beyond the minimum pass in Grade 12. This is important in South Africa since we have various ranges of higher education institutions that offer engineering qualifications of different National Qualification Framework (NQF) levels. Even those institutions that offer the same engineering qualification of the same NQF their minimum entrance requirements are not the same.

Further investigation of engineering education or engineering qualifications indicates that it is possible and acceptable for a grade 12 learner to underperform in grade 12 hence some institutions have extended programs for some engineering qualifications. The extended programs are a government initiative that has been put in place to allow matric students with low pass grades to access tertiary education. Extended programs are designed to equip students who did not meet the minimum entrance requirements with the necessary competency to be successful in their studies (NMU (n.d)). Looking at the University of Johannesburg (UJ), as a higher institution of learning, they do offer extended programs in various engineering education qualifications in their engineering science and technology programs.

### 1.1. Research Objective

The main objective of this paper is to create an awareness that there is a gap that exists between minimum pass requirements and minimum entrance requirements into engineering education qualifications.

## 2. Literature Review

The qualification awarded to learners who will have achieved the set standards in the Grade 12 examinations is the National School Certificate. This certificate is awarded by Umalusi and is the standard against which Grade 12 learners are measured with, Umalusi (2012) and Fleisch (2008). This certificate is also considered by various employers and tertiary education institutions for employment or further studies. However, the entrance requirements in engineering education in higher education demands that learners must have passed Mathematics, English and Physical Sciences. These subjects are very important to matric learners who want to study engineering. According to Umalusi (2012) who demonstrate that a good pass in these major three subjects is critical for students to enroll in engineering education in higher education, Kajander and Lovric (2005).

Literature suggests that language barriers in education remain a critical issue in the South African education system (NMU (n.d)). According to Umalusi (2012), “the minimum pass requirements in order to obtain NSC, a learner must take a language at the home language level, one First Additional language subject, Mathematics or Mathematical Literacy, Life Orientation and a further three subjects”. However Fleisch (2008) suggests that, “making a learner to learn in another language is a disadvantage for learners who are not using that language as a home language since they have to translate to their home language in order to understand”. Since English is the principal language, specifically also for higher education institutions in South Africa, it is generally interpreted as a waste of time to develop the mathematics register for all the local languages. Language used for mathematics affects student’s mathematical capabilities (Sesati (2002)). In South Africa there is a challenge to offer mathematics to a number of authorized languages. In a research conducted by Howie (2003), 8000 scholars in 200 schools were assessed, English expertise and language usage and their relationship with mathematics achievement were sightseen. The study concluded that

the ability of the student to comprehend instructions given in English had a positive effect on passing mathematics, Howie (2003)

According to Branon et al (2012, “the NSC or matric Examination is widely regarded by everyone in South Africa as an important school leaving Certificate”. The same article further indicates that besides the drive on schools and government to achieve high matric success rate individuals who attain NSC stands better chance to further their educational opportunities and to be considered as good candidates in the job market.

According to Education System SA (n.d), “Education in South Africa is continuing to take strain as the government attempts to achieve equal opportunities for all”. The system is divided into 3 strata, namely, “general education and training, further education and training, and higher education and training”. The process requires every learner to study through to grade 9, and extends to 12 grades in total. The system envisages that learners are taught literacy and numeracy in their first 6 years of primary school learning. Since the dawn of democracy the South African government has embarked on a drive of building more schools in the previously disadvantaged areas such as townships and rural areas. However this expansion and access to basic education has not been supported by intense training of teachers, thereby affecting the quality of education delivered to the nation, Education Policy (2012).

In South Africa, education is compulsory through the General Education and Training Phase, or grade 9. After grade 9, students enter what is termed the Further Education and Training Phase (grades 10–12). Oversight of General Education and Training and Further Education and Training in South Africa is done by Umalusi: Council for Quality Assurance in General and Further Education and Training.” NAFS(n.d)

A National Senior Certificate is awarded if a student successfully completes seven examination subjects, four of those examinations being compulsory (First Language, Second Language, Life Orientation, and Mathematics), Branson et al (2012). Additionally, a student must complete three examinations with a 40 percent (achievement mark 3) or better, and the remaining subjects with a 30 percent (achievement mark 2) or better, DBE (2016)

Table1: Current National Senior Certificate grading, Umalusi (2013) and DBE (2013)

Achievement Mark	Percentage	Description
7	80-100	Outstanding
6	70-79	Meritorious
5	60-69	Substantial
4	50-59	Adequate
3	40-49	Moderate
2	30-39	Element
1	0-29	Not achieved

Higher education in South Africa generally resembles to work toward achieving a bachelor’s, master’s, or doctoral degree; though students in more vocationally-oriented subjects may choose to study programs toward a National Certificate or National Diploma (NQF Levels 5 and 6), respectively) SAQA (2011). Bachelor’s degree programs in the arts, sciences and commerce are generally three-year programs. Students in technological fields may work toward a Bachelor of Technology, a four-year degree program, DBE(2016). Upon completion of the Bachelor of Science, or Engineering students wishing to pursue postgraduate study will need to complete an additional year and obtain a bachelor’s degree with an Honours designation. The additional year almost always focuses solely on upper-division study in one specialized subject. The three-year bachelor’s degree in South Africa is benchmarked at Level 7 on the National Qualifications Framework; the Honours Bachelor degree and Bachelor of Technology both are benchmarked at Level 8.

Master’s degree programs are benchmarked at Level 9 on the National Qualifications Framework DBE (2013). Admission to a master’s degree is either an honours bachelor degree, or a Bachelor of Technology. It should be noted that a three-year bachelor’s degree is not considered sufficient study for admission to postgraduate study in South Africa. Master’s degree programs are typically one to two years in duration and may be taught programs or exclusively research-based, depending on the program of study, DBE (2013). The doctoral, or PhD degree, is

benchmarked at Level 10 on the National Qualifications Framework. Almost all doctorate programs in South Africa are completed entirely by research and dissertation. The minimum duration of a doctorate program is two years.

However, studying towards an undergraduate Bachelors' Degree (BEng) in the United Kingdom (UK), takes a maximum of 3 years, with the Undergraduate Masters taking 4 years, and a Masters of Science in Engineering taking 5 years, SAQA (2011).

According to ECSA (2008) "Engineering training in South Africa is typically provided by the universities, universities of technology and colleges for Technical and Vocational Education and Training (previously Further Education and Training)". Most of these qualifications are accredited by the [Engineering Council of South Africa](#) (ECSA). Successful students who will have obtained their engineering qualification have an opportunity to professionally register with ECSA in the following categories, DBE (2013), "Candidate Certificated Engineers, Candidate Engineers, Candidate Engineering Technologists and Candidate Engineering Technicians". DBE (2013)

### 3. Research Methodology

To make sure that the researcher obtain correct information, a 2013 report of the NSC pass requirements was obtained from Umalusi website and additional documents pertaining to grade 12 pass requirements were requested from Umalusi employee via email to verify the information obtained on their system.

For the purpose of this paper (3) three universities who offer engineering education qualifications were used and purposively selected and their available information was analysed. 2018 minimum entrance requirements into engineering qualification in the selected universities were obtained. For the purpose of this paper, minimum entrance requirements from the university of Witwatersrand and University of Pretoria were obtained from their respective websites while the minimum entrance requirements from the University of Johannesburg was obtained from their prospectors available at their administration office at the university of Johannesburg.

Few questions were formulated for students to provide their perceptions on entrance to engineering education at university or higher institution of learning. The questions asked to grade 12 learners include included:

- If you intend to study engineering at tertiary level how should you pass your grade 12 at the end of the year?
- Is the way you are considered competent during the year good enough to enable you to enter any engineering qualification in tertiary?
- Is there a need to adjust minimum pass requirements in grade 12 to enable learners to enter engineering education qualification?

The minimum entrance requirements for the three universities were individually compared with the minimum pass requirements of Grade 12, which is also known as the senior phase and are endorsed by Umalusi.

### 4. Results

The researchers looked at the minimum pass requirements for the National Senior Certificate if a learner wish to enroll at a university or higher institution of learning. The criteria used to differentiate the classes of pass are based on marks obtained in definite subjects and a combination of certain subjects. Table2 presents a summary of the existing differences. Variances shown in Table 2 were studied from non-specified original requirements. It is important to note that the basic NSC which does not give a learner access to higher education and training has a sub-minimum of 40% in three subjects including the Home Language (HL), and 30% in three more subjects at a sub-minimum of 30% and the student must have his/her School Based Assessment (SBA) submitted including having passed Life Orientation.

The additional level of pass which gives students an opportunity to be admitted to Higher Certificate programs is fundamentally the same. The only difference will be that students will have obtained a minimum of 30% in the language of instruction and learning of the university or Further Education and Training that they propose to register with. Majority of courses offered normally require English. However it is also ideally possible to attain this category

with Afrikaans or alternative South African language should the expected course be available in that language, DBE (2016).

The language requirements for the Umalusi endorsement of the Higher Certificate, Diploma and Bachelors is the same. However Higher Education South Africa (HESA) requires that learners to have passed specific subjects at higher grades of achievement.

Table 2 Nation Senior Certificate, Umalusi (2013)

<b>National Senior Certificate with Admission requirement to</b>				
	<b>NSC</b>	<b>Higher Certificate</b>	<b>Diploma</b>	<b>Bachelors</b>
Home Language	40%			
First Additional Language	3 Subjects passed with $\geq 40\%$ (including the HL) and 3 passed with $\geq 30\%$ . Can fail one subject, provided there is full evidence of the SBA having been completed.	The NSC with a minimum of $\geq 30\%$ in the language of learning and teaching (LOLT) of the HE institution	minimum of $\geq 30\%$ in the LOLT of the HE institution, and $\geq 40\%$ in four recognized 20-credit subjects [that is, excluding Life Orientation]	The NSC with a minimum of $\geq 30\%$ in the LOLT of the HE institution and $\geq 50\%$ in four designated 20-credit subjects [that is, excluding Life Orientation]

According to, Circuit Manger-Soutpansburg East-Limpopo, (Unpublished report) Mr Baloyi; he mentioned that students who wishes to study Engineering education should be from the science stream and he formulated a table that shows how the subjects are grouped for well-known subjects. Table 2 shows how students are considered competent and expected to enrol for engineering education in higher institution of learning.

Table 3: Shared by Baloyi FR (2018)

Subject	Higher Certificate	Diploma	Bachelors
Home Language	40%	40%	50%
First Additional Language	40%	40%	50%
Mathematics	30%	40%	50%
Science	30%	40%	50%
Life Orientation	30%	40%	40%
Choice 1 subject –Life Science	30%	30%	40%
Choice 2 subject-Geography	30%	30%	40%
Choice 3 subject-Agric Science	30%	30%	40%

By looking at table 3 above it is clear that if a learner should obtain 40% or higher in three subjects including HL and LOLT together with a minimum of 30% in the other three subjects in order to be awarded a higher certificate pass.

To obtain a Diploma a learner should obtain at least 40% in four subjects including HL and LOLT together with a minimum of 30% on the other three subjects. For learners to obtain bachelor's degree pass he/she must obtain a minimum of 50% in four subjects together with a minimum of 30% on the other two subjects.

Looking at the minimum pass requirements for learners to obtain a NSC it important to also appreciate the minimum entrance requirements for engineering education For the purpose of this research, one engineering course was selected to investigate the minimum entrance requirements. The following table 4 show the minimum entrance requirements for learners to be admitted in Industrial engineering from three different Universities.

Table 4: Minimum Entrance requirements (own creation)

University	Minimum APS	English	Mathematics	Physical Sciences	Duration
University of Johannesburg (BEng Tech)	30+	5(60%+)	5(60%+)	5(60%+)	3 years
University of Witwatersrand (BEng)	40+	5(60%+)	5(60%+)	5(60%+)	4 years
University of Pretoria (BEng)	30+	5(60%+)	6 (70%+)	5(60%+)	4 years

The following statement was obtained from the Prospectors of one of the universities attached as part of the requirements for admission “Note: Due to the limited number of places available, admission is not guaranteed. Selection will be based on final NSC results. Generally, students who achieve at least 70% in Mathematics, Physical Science and English stand a greater chance of being accepted.” Looking at this statement and the minimum pass requirements for grade 12 the percentage set is too high compared to the minimum pass in grade 12 as signed off by Umalusi.

## 5. Conclusion

It can be concluded that there is indeed a minimum requirement gap between matric pass requirements and engineering education entrance requirements. The gap results in students adding time by upgrading matric results then enroll for an engineering education qualification. This gap also leads students becoming demotivated and end up enrolling for a qualification they did not intend to study for since they do not qualify to study engineering.

Higher institutions of learning that are offering engineering education qualifications should be involved in addressing this gap as accessibility to engineering education is very important, but it has no value if learners are not able to enroll.

## 6. Recommendations

It is recommended that an intensive career guidance be conducted to provide high school learners with knowledge about entrance requirements to engineering education qualifications. The Department of Basic Education and Training should meet with the Department of Higher Education and Training and discuss the gap that exist between minimum pass requirements in matric and minimum entrance requirements to engineering education and other qualifications.

It is also recommended that senior students who are enrolled for engineering education qualifications must be encouraged to visit the high schools they attended to share their experience and knowledge about minimum entrance requirements to different qualifications in engineering. Higher institutions offering engineering education should have dedicated staff member who go to high schools to share information about minimum entrance requirements to engineering education and other courses related to engineering.

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